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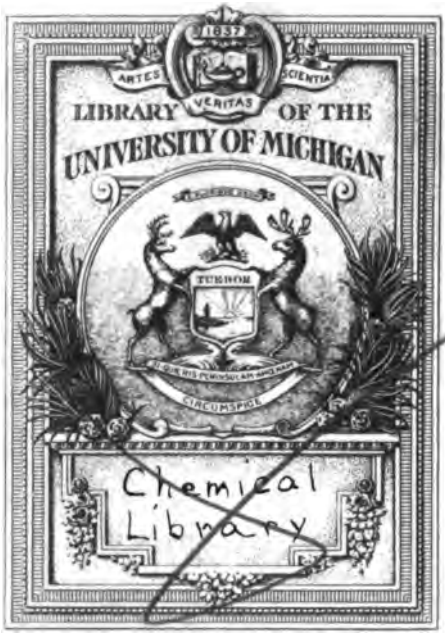

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THE NEW INTERNATIONAL ENCYCLOPÆDIA

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BIG-END'IANS, THE. The name of the sect in *Gulliver's Travels* under which Swift satirized the Catholics, so called because the Big-endians dogmatically asserted that an egg must be broken at the larger end. They were opposed to the Little-endians, the Protestants, who were equally stout in their contention that eggs must be broken only at the smaller end.

BIG HATCHIE, häch'ĭ. A small river of the United States, rising in northeast Mississippi, one head branch in Prentiss County, but the larger one in Union County (Map: Mississippi, H 1). It flows through a fertile cotton region north into Tennessee, and then northwest, joining the Mississippi River 5 miles above Randolph, and nearly 40 miles above Memphis. It is nearly 200 miles long, drains an area estimated at 4000 square miles, and is navigable for small steamboats for about 100 miles to Bolivar, Tenn.

BIG'HEAD' (OSTEOPOROSIS). A bone disease in which the bones become more massive and less compact by reason of an increase in the cancellate tissue. The disease affects horses and mules of all breeds and ages. The enlargement of the head is the most conspicuous symptom; hence the name. A peculiar lameness precedes or accompanies other symptoms. The animal takes short steps. The ribs undergo certain changes so that a round-barreled horse becomes flat-sided. Recovery from the disease is rare.

BIG HORN. A river of the Rocky Mountain region of the United States, rising in the Wind River range in Fremont County, Wyoming, near the central part of that State (Map: Wyoming, E 3). It flows northward into Montana, and following thence a northeasterly course it empties into the Yellowstone River, of which it is the chief tributary. Its principal headstream is the Wind River, which rises in the Shoshone Mountains in Wyoming, southeast of the Yellowstone National Park. Its source is between 8000 and 9000 feet above sea-level. The principal tributaries of the Big Horn are the Grey Bull and Stinking Water rivers in Wyoming and the Little Big Horn River in Montana. Its total length is about 450 miles and it is navigable up to its juncture with the Little Big Horn at Fort Custer. The famous Custer massacre took place in the valley of the latter in 1876. The Big Horn drains an area estimated at over 20,000 square miles. The scenery along the river's course is magnificent.

BIG'HORN'. The popular name in the United States of the Rocky Mountain sheep, on account of their immense, semi-spiral, argali-like horns. These sheep, in one or other of their species, were formerly to be found throughout the whole Rocky Mountain system from New Mexico to the Arctic Circle; and they are still numerous from Montana northward and only less so southward, in the higher ranges. They are gregarious, fond of the highest pastures, wary, and much hunted not merely for sport, but because the flesh is excellent and the horns make handsome trophies.

"To many American sportsmen and naturalists," remarks William T. Hornaday (*Fifth Annual Report New York Zoölogical Society*), "there is no other wild animal on this continent which challenges admiration equal to that bestowed upon the mountain sheep. Unfortunately, it is only those who have made the acquaintance of this animal in life, and upon its own ground, who have a fair conception of. . . . the true character of this hardy mountaineer, in whose anatomy strength is combined with agility to an extent which is nothing short of marvelous. Its home is the loftiest rim-rock of the high mountain plateaus, or the most rugged and forbidding Badlands of the middle altitudes. In summer its favorite pastures are the treeless slopes above timber-line, and in winter it paws through the snow of the mountain meadows to reach the tallest spears of grass. . . . All the year round this animal is both well-fed and well-clad, and its savory flesh invites constant pursuit and attack from the mountain lion and hunters both white and red. Unlike its dull-witted neighbor, the mountain goat, the mountain sheep is wide-eyed and wary, and difficult to approach."

The best-known species is the common bighorn (*Ovis cervina*), which is very stoutly built, stands about 40 inches high at the shoulder, is

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grayish-brown, with the face ashy, a dark line along the spine, and the under parts and conspicuous 'caudal disk' on the buttocks whitish. The horns of the ram are massive, thick and keeled on the outer edge, springing backward and then downward in a majestic sweep, and measuring 42 inches in largest specimens around the curve; those of the ewe are short and ribbed. It dwells in bands sometimes containing fifty or more of all ages throughout all the high mountains from the Dakota Badlands to Arizona, California, and northern British Columbia. A smaller and paler variety, inhabiting the central basin, is called Nelson's bighorn. A second species is Stone's bighorn, lately found in northern British Columbia, which is larger, and has comparatively slender, pale-brown outward-curving horns; its general color is a blackish-brown grizzle, with the spinal stripe, throat, chest, sides, buttocks, and tail and hoofs almost black. Another species belongs to the mountains of Central Alaska, north of 60°, named *Ovis Dalli*, which is altogether white, in winter perfectly free from the few brownish hairs that may appear in its summer coat. The horns are of moderate size, and of a clear amber color. A fourth species, also Alaskan, has been described as *Ovis Fannini*, and resembles Dall's sheep, except that the body is brownish-gray, leaving the head, neck, breast, belly, and rump white. See Plate of WILD SHEEP, ETC.

Consult: Mayer (editor), *Sport with Gun and Rod* (New York, 1883); Roosevelt, *Hunting Trips of a Ranchman* (New York, 1883); Baillie-Grohman, *Camps in the Rockies* (London, 1882); and *Fifteen Years' Sport and Life in Western America* (London, 1900).

BIG JAW. See ACTINOMYCOSIS.

BIG LAU'REL. See MAGNOLIA.

BIG'LOW, HOSEA. See LOWELL, JAMES RUSSELL.

BIGLOW PAPERS, THE. The title of a series of satirical poems in the Yankee dialect by James Russell Lowell. They appeared in two parts. Part I., voicing the New England opposition to the Mexican War, was brought out in 1848, and Part II., concerned with the Civil War, was published as late as 1867. The whole is under the fictitious editorship of the Rev. Homer Wilbur. Lowell's wit and humor are here unstinted. Written rapidly and with great personal delight, the work was warmly received, and parts of it are still very popular.

BIGNON, bē'nyōn', LOUIS PIERRE EDOUARD (1771-1841). A French statesman and historian. After serving as secretary of legation in Switzerland (1797-99), he was sent in the same capacity to Berlin (1800), where he became chargé d'affaires in 1802. He subsequently was minister plenipotentiary to Cassel (1804-06), and, after the battle of Jena, was administrator of finances in the Prussian provinces occupied by the French (1806-08). After serving in the same capacity in Austria (1809), he was sent as special envoy to Warsaw, where his encouragement and advice contributed to arouse the Poles to an energetic resistance against Russia and Austria (1813). After the return of Napoleon from Elba in 1813, he successively became under-secretary of state and minister of foreign affairs. From 1817 to 1837 he was a member of the Chamber of Deputies, where his eloquence and sound views and liberal policy obtained for him considerable popularity. His principal work is entitled *Histoire de France depuis le 18 Brumaire jusqu'en 1812* (1829-38).

BIGNO'NIA (named after the Abbé Bignon). A genus of Bignoniaceæ embracing about 100 species of twining shrubs. Most of the species are South American, although one, *Bignonia capreolata*, occurs in the southern United States. Many of the species are cultivated in greenhouses for their striking habit of growth. They climb by twining and by tendrils. The flowers of many are very handsome. The long flexuous stems are frequently used as cordage substitutes, and the natives of French Guiana are said to weave the split stems into mats, baskets, etc.

BIGOD, bĭg'od, HUGH (?-1176). First Earl of Norfolk. He was a son of Robert Bigod, who had come to England with William the Conqueror. The origin of the family name has been traced to the oath 'bĭ got,' frequently used among the Normans. Bigod is said to have secured the throne to Stephan by swearing to Archbishop William Corbois immediately after the death of Henry I. that the latter on his deathbed had quarreled with his daughter Matilda, and had disinherited her in favor of Stephan of Blois, whose arrival in England shortly afterwards seemed to substantiate this statement. In recognition of his services, Bigod subsequently received the earldom of Norfolk.

BIGORRE, bē'gōr' (from the Gallic people *Bigerri*, or *Bigerriones*). A mountainous district in the southwestern part of France, formerly constituting a part of Aquitaine and subsequently of Gascony. It is now included in the Department of Hautes-Pyrénées. In mediæval times it was ruled by counts of the houses of Foix and Albret, and was united to France on the accession of Henri IV. Tarbes (q.v.) has been the chief town since the days of the Romans. Consult Troidour, *Mémoire du pays et des états de Bigorre* (Paris, 1892).

BIGORRE, L'ABBÉ. The pseudonym signed to Voltaire's *History of the Parlement of Paris*, published in Amsterdam, in 1769.

BIG RAP'IDS. A city and the county-seat of Mecosta County, Mich., 55 miles north of Grand Rapids; on the Muskegon River, here crossed by two bridges, and on the Grand Rapids and Indiana and the Père Marquette railroads (Map: Michigan, H 5). It has a public library, and a fine courthouse and jail, and is the seat of the Ferris Institute. Good water-power is supplied by the river, and the city has an extensive lumber trade and manufactures of furniture, veneer, doors, sash, blinds, bed-spring frames, stoves, and cast-iron pipes. Settled in 1859, Big Rapids was incorporated ten years later. It is governed by a charter of 1887, revised 1895, which provides for a mayor, elected annually, and a city council. The waterworks are owned and operated by the city. Population, in 1890, 5303; in 1900, 4686.

BIG SAND'Y. A navigable affluent of the Ohio River, formed by the junction of two main forks on the border between Kentucky and West Virginia and flowing north to the Ohio, separating these two States (Map: West Virginia, B 3). The east fork, called Tug Fork or Tattarawka River, rises in West Virginia near

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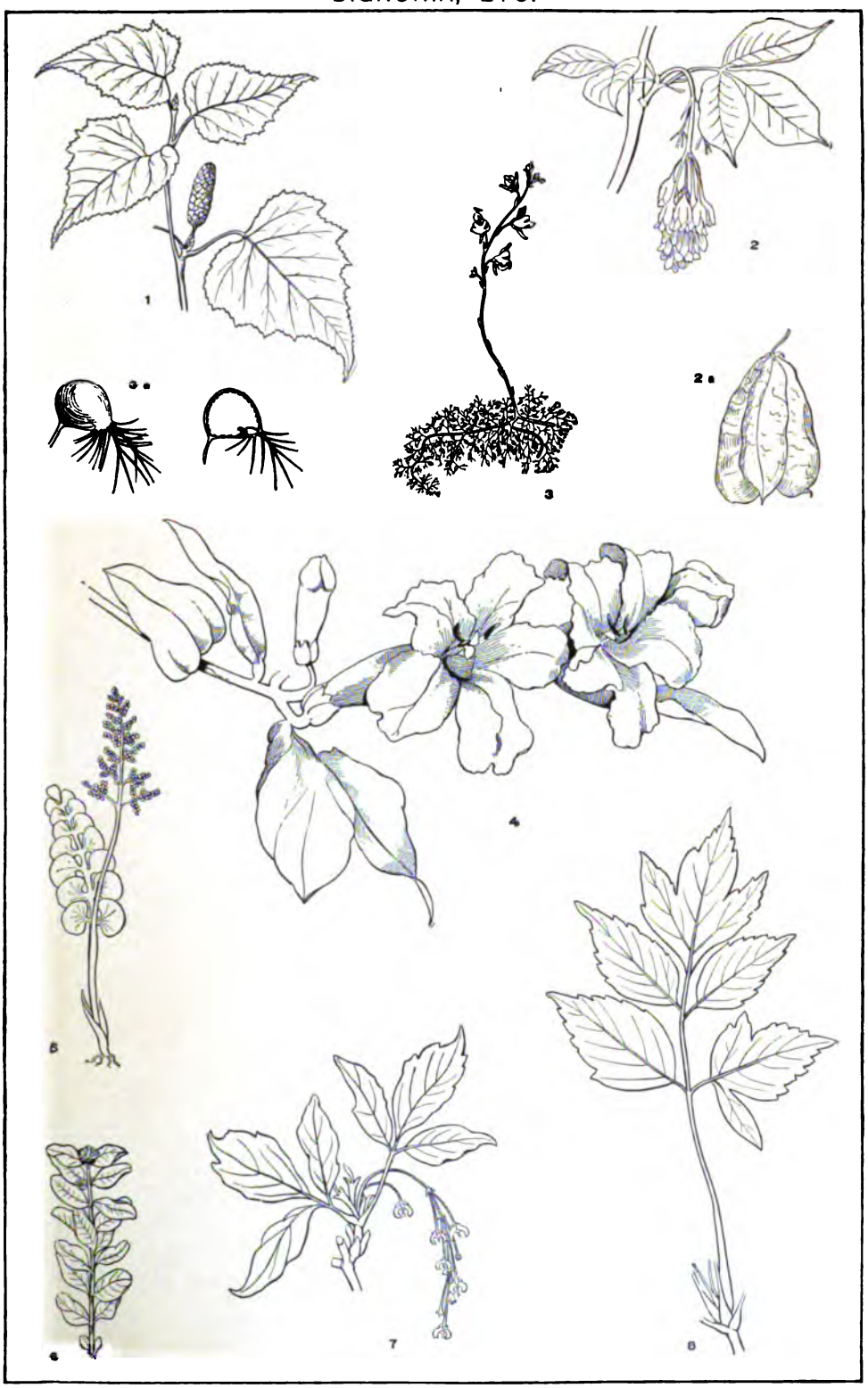
BIGNONIA, ETC.



1. BIRCH (Betula populifolia).
2. BLADDERNUT (Staphylea trifolia): *a*, fruit enlarged.
3. BLADDERWORT (Utricularia vulgaria); *a*, an utricle of Bladderwort, entire and opened to show valve.
4. BIGNONIA CHERERE.
5. MOONWORT (Botrychium lunaria).
6. BOX (Buxus sempervirens).
7. BOX ELDER (Negundo aceroides): a flowering spray.
8. BOX ELDER, a mature leaf.

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the Virginia line, and flowing northwest, forms with the Big Sandy the southern boundary between West Virginia and Kentucky. The west fork, called the Levisa Fork, rises in southwest Virginia, and flows northwest into Kentucky and then northeast to its junction with Tug Fork. Both branches pass through a heavily wooded country, but the best timber has been removed. The river drains an area of over 4000 square miles and lies in the Ohio coal-producing area. It empties into the Ohio River near Catlettsburg, Ky., and is navigable for small boats for 100 miles.

BIG SPRING. The county-seat of Howard County, Tex., 270 miles west of Fort Worth; on the Texas and Pacific Railroad (Map: Texas, D 3). It is an important railroad town, with division shops, offices, etc., of the Texas and Pacific, and has a considerable trade in the products of the surrounding region, principally live stock, hides, fruit, and agricultural produce. There are extensive deposits of salt underlying the town, and in the vicinity is an immense spring from which it derives its name. Population, about 2000.

BIG TREES. See SEQUOIA.

BIG WAR'RIOR. See BLACK WARRIOR.

BIHAČ, or **BIHATCH,** bē'hŏch. A fortified town of Bosnia, capital of a district of the same name. It is situated on an island in the Una, near the frontier of Dalmatia. It has been the scene of frequent contests during the Turkish wars (Map: Austria-Hungary, D 4). Population, in 1895, 4330, chiefly Mohammedans.

BIHE, bē'â. A portion of the Portuguese West African colony of Angola (q.v.).

BIJAPUR, bē'jà-pōōr' (Skt. *vijaya*, victory + *pur*, city). A decayed city in the Presidency of Bombay, British India, on an affluent of the Kistna, 245 miles southeast of Bombay (Map: India, C 5). Bijapur was for centuries the flourishing capital of a powerful kingdom, falling therewith under various dynasties in succession, Hindu and Mussulman, till, in 1686, it was captured by Aurangzeb. Early in the Eighteenth Century it passed into the hands of the Mahrattas. On the overthrow of the Peshwâ, in 1818, it was assigned by the British to the dependent Rajah of Satara. Bijapur presents a contrast perhaps unequaled in the world. Lofty walls, of hewn stone, still entire, inclose the ruins of a city which is said to have contained 1600 mosques and 100,000 dwellings. With the exception of an ancient temple, the sole relic of aboriginal domination, the ruins are Mohammedan, and consist of beautiful mosques, colossal tombs, and a fort of more than 6 miles in circuit, with an inner citadel. An additional wonder of the place is the largest piece of brass ordnance in existence, cast at Ahmednagar. Population, about 17,000. Consult: Fergusson, *Ancient Architecture in Hindostan* (London, 1847); Fergusson, *The Study of Indian Architecture* (London, 1867).

BIJNS, bīns, ANNA (c.1494-1575). A Flemish poet. She was born at Antwerp, and was the first writer of the Sixteenth Century in the native language. Her best-known verses are collected in her *Schoone Refereynen Schruftueren ende Leeringen teghen Talle Kettereyen* (1528; with commentaries by Van Helten and Jonckbloet, 1876), which were frequently republished and won for the author the name of 'Sappho of Brabant.' Most of these refrains are energetic epigrams against Luther and his adherents, but all are written in a language of singular purity for that period. Those which are free from religious intolerance show much more poetic fire than is found in the works of her contemporaries. A collection of ninety-four of her other poems was published by Van Helten (1886).

BIKANIR, bē'kà-nēr'. The capital of the native State of the same name in Rajputana, India, situated in a desolate tract, 250 miles west-southwest of Delhi in latitude 28° N. and longitude 73° 22′ E. (Map: India, B 3). Population, in 1891, 56,300; in 1901, 53,100. It is surrounded by a battlemented wall 3½ miles in circuit, and from a distance presents a magnificent appearance with its carved Jain monasteries, palace, and buildings, but inside, the streets are narrow, and, like the inhabitants, dirty. Immediately to the northeast is a detached citadel, of which the Rajah's residence occupies the greater part. The State of Bikanir is in latitude 27° 30′ to 29° 55′ N. and longitude 72° 30′ to 75° 40′ E., measuring, in its extremes, 160 miles by 200 miles. It contains 23,340 square miles. Population, in 1891, 832,000; in 1901, 584,700. The Rajputs are the predominant race; but the Jats form the great body of the inhabitants. Though the people find their principal resource in pasturage, yet water is remarkably scarce. In the whole territory there is not one perennial stream; while wells, as precarious and scanty as they are brackish and unwholesome, average 250 feet in depth. In 1868-69 nearly half of the population were destroyed by famine. The temperature varies greatly. In the beginning of February ice is formed on the ponds; and in the beginning of May the thermometer stands at 123° F. in the shade. In the beginning of November each period of twenty-four hours, according as the sun is above or below the horizon, presents such extremes of heat and cold as often to be fatal to life.

BIKELAS, bē-kā'làs, DIMITRIOS (1835—). A modern Greek poet and historian. He early attracted national attention by his patriotic hymns, and has rendered into modern Greek several plays of Shakespeare. His chief historical works have appeared under the titles: *The Greeks of the Middle Ages* (1878); *The Rôle and the Aspirations of Greece in the Eastern Question* (1885); and *Greece, Byzantine and Modern* (1893).

BILANE, bē-lä'nâ. See VILANE.

BILBAO, bēl-bä'ō (Basque *Ibaizabel*, 'under the hill'). A seaport town of Spain, capital of the Province of Vizcaya, situated in a mountain gorge on the Nervión, about 8 miles from its mouth at Portugalete (Map: Spain, D 1). Bilbao is well built, the principal streets are straight, and the houses substantial. Five bridges, one a stone bridge of the Fourteenth Century, cross the river which divides the old town from the new. There are several fine public walks, numerous fountains, but no public buildings of any note. The city is purely commercial. It has many extensive rope-works, and manufactures of hardware, leather, hats, tobacco, and earthenware. There are also docks

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for building merchant vessels, and in the vicinity are iron and copper mines. The Nervión has been deepened so as to be navigable by vessels drawing twenty-two feet, and at present Bilbao is one of the most important trading ports of Spain. The imports consist chiefly of cotton and woolen manufactures, colonial produce, fish, jute, spirits, hardware, machinery, railway materials, etc.; and the exports consist of wool, iron, fruits, oil, flour and grains, wines, madder, minerals, liquorice, etc. The women here do almost all the heavy porterage. Bilbao owes its present prosperity to the iron-mines which stand on the left bank of the Nervión. Their valuable deposits were known to exist from the earliest times, but the mines have only been worked within the last decades of the Nineteenth Century. Bilbao was founded in the year 1300 by Diego Lopez de Haro, under the name of Belvao, i.e. 'the fine fort,' and, being well situated and little disturbed by the civil wars of Spain, it soon attained great prosperity. In the Fifteenth Century it was the seat of the most authoritative commercial tribunal in Spain. It suffered severely in the wars with France, first in 1795, and again in 1808, when 1200 of its inhabitants were slaughtered in cold blood. Population, in 1897, 74,100.

BIL'BERRY. See HUCKLEBERRY.

BIL'BILIS. An old Celtiberian city of Spain, about two miles east of the modern town of Calatayud, in the Province of Saragossa. It is chiefly celebrated as the birthplace of the poet Martial, but is also famed for its highly tempered steel blades. Under the Romans Bilbilis was a municipal town with the surname of Augusta.

BIL'BOES. See IRONS.

BILDERDIJK, bĭl'dĕr-dĭk, WILLEM (1755-1831). A Dutch poet, philologist, and philosopher. He was born in Amsterdam, September 7, 1755, studied law in Leyden, and then practiced it at The Hague. In 1795 he was exiled as an anti-Revolutionist, and went to London and Brunswick, after a discreditable love affair with Katherina Schweikhardt, redeemed later (1802) by marriage. Katherina was herself author of a narrative poem *Rodrigo the Goth*, and of graceful *Poems for Children*. On Bilderdijk's return to Holland (1806) King Louis made him librarian and patronized him in various ways, but he was rather overweening and ungrateful, and at last, refusing to live in Amsterdam, went to Leyden (1817), where he lectured on history till 1827. Bilderdijk's industry was indefatigable. While in Germany he translated *Ossian* and wrote *Country Life and Patriotic Love for Orange*. After his return he wrote *The Disease of Genius*, *Leyden's Battle*, several dramas, and his poetic masterpiece, *The Destruction of the First World*. His entire production approaches 100 volumes. His poetry had no deep sentiment, and never caught the romantic inspiration. In politics he stood, in later years, almost alone as an ultra-conservative. His greatness lies in a mastery of language that no Dutch poet since Huygens had approached. Bilderdijk's *Works* are collected in 15 vols. (1856-59). Consult Gorter, *Bilderdijk* (Amsterdam, 1871).

BILE (Lat. *bilis*, bile, anger). A fluid secreted by the liver. It is golden-red in man, green in herbivorous, brownish-yellow in carnivorous animals. The primary cells of the liver (the hepatic cells) separate the bile from the blood of the portal vein, and discharge it into small ducts, which unite to form larger ones, and eventually the right and left hepatic ducts. The latter unite to form the common hepatic duct, which is soon joined by that of the gall-bladder (the cystic duct). This junction forms the common bile-duct, which pierces the second part of the duodenum, and, running obliquely in its walls for a short distance, opens on its mucous surface. Between twenty and fifty ounces of bile are secreted daily, principally within an hour after eating, and to some extent during the intervals of digestion. Some bile remains stored in the gall-bladder, where it becomes viscid and of darker color. If it becomes solidified, gall-stones are the result, causing great pain as they pass through the gall-duct. Bile passes into the intestine and assists in the digestion of fats, stimulates the peristaltic motion of the intestine, and disinfects the contents of the large intestine. If the escape of the bile into the intestine be prevented by swelling of the part by the duodenum where the common bile-duct empties, the bile is carried by the blood into various parts of the body, causing jaundice (q.v.). Bile is composed of water, fat, resinoid acids (glycocholic and taurocholic), mucus, various salts, and soda. Its specific gravity is 1.026. It has a bitter taste and a peculiar strong odor. The bile of salt-water fish contains potash, while that of land and fresh-water animals contains soda. See CALCULUS; DIGESTION; JAUNDICE; and LIVER.

BILFINGER, bĭl'fĭng-ĕr, or **BÜLFINGER,** bul'fĭng-ĕr, GEORG BERNHARD (1693-1750). A German mathematician and philosopher of the Leibniz-Wolffian school. He was a son of a Lutheran minister of Kannstatt, Württemberg, and, like several others of his family, was born with twelve fingers and twelve toes. He studied at Halle under Wolff, became professor of philosophy in 1721, and of mathematics also in 1724. In 1725, on Wolff's recommendation, he obtained a professorship in Saint Petersburg, whence he was recalled in 1731. He gained the prize (1000 crowns) offered by the Academy of Science of Paris for a solution of the problem of the cause of gravity. Later in life he was a privy councilor at Stuttgart, and greatly advanced the interests of public instruction and agriculture. Among his numerous works, the most important is *Dilucidationes philosophicæ de Deo*, in which he expounded minutely and defended against its opponents Wolff's division of metaphysics into four branches.

BILGE (akin to *bulge*, a rounded protuberance, Lat. *bulga*, a leathern bag). That portion of the bottom of a ship which is nearer horizontal than vertical. The bend in the frames which joins the bilge to the side is called the *turn of the bilge*. If the turn of the bilge is sharp, the vessel is said to have a *hard bilge;* if rounding, to have an *easy bilge*. If the bilge frames amidships run nearly horizontal, the ship is said to have very little *dead rise;* if they incline upward at quite an angle as they leave the keel, she has considerable *dead rise*. When a vessel strikes the ground with such force as to cause serious

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injury in the bilge, she is said to be *bilged*. The upper side of the floor-timbers in a wooden ship, and of the inner bottom in a modern vessel, form, near the midship line, natural drainways for any water which may leak into or be formed in the ship, and are called *bilges*. The largest circumference of a cask is called the *bilge*.

BILGE BLOCKS. A series of blocks on which the bilges of a ship rest when she is in a dry-dock.

BILGE KEEL. A V-shaped keel riveted to a ship's bottom near the turn of the bilge for the purpose of checking her rolling. These keels are very effective, and few large ships are now built without them. A comparison of the behavior of two 15,000-ton British battle-ships, one fitted with bilge keels and one without them, showed that the gain in a rough sea was very great; at one time the ship without bilge keels was rolling 28 degrees each way, while her sister ship with keels 30 inches deep only rolled 11 degrees.

BILGE KEELSON. An internal longitudinal stiffening plate or timber inside the bilges.

BILGE-WATER. The water which collects in the bilges. It has a peculiar fetid odor which is very strong if the bilges are not kept as clean as possible. In the ships of the navy bilges are pumped out at least once a day and carefully cleaned once a week. In wooden ships it is very difficult to keep the bilges clean, and sickness on board has often been ascribed to their foulness.

BILGEWAYS. A series of timbers on the launching ways. The cradle, which supports the body of the ship in launching, rests on the bilgeways.

BILGUER, bĭl'gwĕr, PAUL RUDOLF VON (1815-40). A German chess-player, born at Ludwigslust. He was at an early age one of the most accomplished players of his day. He frequently gave exhibitions of memory feats, such as playing two games simultaneously, without watching the board. His *Handbuch des Schachspiels* (completed by Von Heydebrand and Von der Lasa, 1891) is regarded by many as the authority on the subject.

BILHANA, bêl-hä'nâ. An Indian poet of the Eleventh Century. He was born in Kashmir and is supposed to have died in the Deccan. His most celebrated work is the *Cāurisuratapancāçikā*, a lyric poem of about fifty strophes, of which several versions have been preserved. Consult Höfer's metrical translation in the *Indische Gedichte* (Leipzig, 1844).

BILIM'BI. See CARAMBOLA.

BILIN, bê-lēn' (Bohem. *Bilina*, from the river *Biela*, white). A town of the Austrian Crownland of Bohemia, beautifully situated in the valley of the Biela, about 6 miles southwest of Teplitz. It has important agricultural industries and is famous for its alkali springs. Over one million bottles of the water are exported annually. Population, in 1890, 6000; in 1900, 7800. In the vicinity rises the remarkable isolated clinkstone rock, called the Borschen, or Biliner Stein.

BIL'IO'SO. A character in *The Malcontent*, a tragi-comedy by Marston (1604).

BILIOUS FEVER. See FEVER; INFLUENZA.

BILL, or **BEAK.** See BIRD.

BILL (LLat. *billa*, for Lat. *bulla*, anything rounded; seal, stamp; edict, bull). In legislation, the common name for a proposed legislative act. It was found a more convenient form of enacting laws than the old Parliamentary method of petition to the sovereign. Bills are of two kinds, public and private, according as they by their terms affect the particular interest of any person or persons, whether private individuals or corporations, or the interests of the people at large. In the United States Congress bills for raising revenue must originate in the Lower House, but the Senate may propose and make amendments. See LEGISLATION; JUDICIAL NOTICE; CONGRESS; BILL OF ATTAINDER, etc.

IN THE LAW OF PLEADING. A general term descriptive of various forms of pleading by which actions are instituted, both at common law and in equity. In criminal law, the written accusation or presentment of a grand jury is known as a bill. See INDICTMENT; GRAND JURY; BILL IN EQUITY, etc.

BILLAUD-VARENNES, bê'yô' vâ'rĕn', JEAN NICOLAS (1756-1819). A French revolutionist. He was a member of the National Convention in 1792, voted for the execution of Louis XVI. within twenty-four hours and for the death of the other members of the royal family, and favored in every way the most violent measures. He was subsequently president of the Convention and a member of the Committee of Public Safety. Though he assisted in the overthrow of Robespierre, he ultimately shared the fall of the Terrorists and was transported to Cayenne in 1795. He visited New York in 1816, but was coldly received and went to Haiti, where he died, 1819.

BILLBOARD. See ANCHOR.

BILLET (Fr. *billet*, a ticket, dimin. of *bille*, bill, note). A naval term denoting the station or employment of an individual. A *sleeping billet* is the numbered space assigned to a member of the crew in which he is required to swing his hammock. A *station billet* is a memorandum of his station and duties furnished to each member of the crew; one is given to him when he first comes on board, and if he be afterwards changed to another division or part of the ship, his station billet is changed accordingly.

BILLET-HEAD. A scroll-head of a ship at the end of the timbers underneath the bowsprit. It replaced the old figurehead in vessels of the middle and latter part of the Nineteenth Century.

BILLET. In architecture, an ornament consisting of a series of short cylinders spaced along a straight line and formed by cutting a molding —generally a round molding—into notches, so that the parts left resemble billets of wood. When used in several rows, the billets and empty spaces are placed interchangeably. It is frequent in Norman buildings.

BILLET. See HERALDRY.

BILLET, bê'yâ', FÉLIX (1808-82). A French physicist, born at Fismes (Marnes). He became professor of physics at the University of Dijon in 1845, and dean of the faculty in 1873. His name has become associated with the apparatus known as the "Bilentilles de Billet." His numerous important works include the following: *Sur les changements de volume des corps par le passage de l'état solide à l'état liquide* (1845); *Condensations électriques de deuxième et de troisième espèce* (1851); *Traité d'optique physique*

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(1858); *Mémoire sur les demi-lentilles d'interférences* (1862).

BILLETING (Fr. *billet*, ticket, dimin. of OF. *bille*, bill), or QUARTERING. A system of provisioning and lodging soldiers, when not in camp or barracks. Before the era of permanent barracks in England, soldiers were billeted or quartered on the citizens, who were compelled to support them. The abuses and hardships endured by citizens generally because of this arrangement brought about the erection of permanent barracks. (See BARRACKS.) One of the grievances which led to the American Revolution was the quartering of British troops upon the people without their permission. At the present time 'quartering' is restricted in the United States by the third amendment of the Constitution. In England it is confined to troops on the march and individual soldiers traveling on special duties. The keepers of inns or public houses, or citizens—failing the former—on whom troops may be billeted are paid according to a scale fixed by the Government.

BILLFISH. A fish having the snout much drawn out in the form of a bill, as: (1) A gar. (See GARFISH and GAR-PIKE.) (2) SPEAR-FISH (q.v.), or some similar form.

BILL-HOOK. An intrenching tool, used for cutting underbrush in clearing passages through jungle-growths, etc., and clearing camping-grounds, or bivouacs. It is also used for securing materials for gabions, fascines, and other defensive supports. The regimental pioneers of European infantry carry a bill-hook as part of their equipment. The bolo of the Filipinos and the machete of the Cubans closely resemble it, both in practice and general use. See ENGINEERING, MILITARY.

BILLIARDS (Fr. *billard*, originally the cue, from *bille*, a log of wood, cf. Eng. *billet*). A game of skill, whose development as a scientific indoor game is wholly modern. Its origin is obscure. Some assert that it was brought from the East by the Crusaders. Cotton, in his *Compleat Gamester* (1674), wavers between Spanish and an Italian origin; but there is better reason to believe that de Vigne, an artist of the Court of Charles IX. of France (c.1571), designed tables and drew up a code of rules. In any case, it was known in England soon after this time. Spenser, in his *Mother Hubbard's Tale* (1591), speaks slightingly of those who play—

> With dice, with cards, with balyards far unfit,
> With shuttlecock, misseeming manly wit.

It was originally an outdoor sport, played on the ground, at first with round stones, later with two balls, an ivory post, an upright cone called a king, and two sticks called masts (maces), made of heavy wood and tipped with ivory. It was then played in a similar form indoors upon a table, still with two balls, an iron arch being used through which the ball was driven; beyond this was the king, and pin pool is a survival of this primitive form. In the Eighteenth Century holes, called 'hazards,' and suggested probably by the iron arch, were cut in the bed of the table—first in the centre, then at the corners and sides—into which the balls were driven. Then the French added the third, or red ball, introducing the carambole or carom game, which involves striking both the other balls with the cue-ball.

The next period of development is marked by improvements in the materials of the game. Where the end of the cue had been simply made rough with a file so that chalk might adhere to it and prevent slipping off the ball, the French player Mangin introduced leather tips (first used in the United States in 1823), and a little later marble and slate came to be employed instead of wood for the bed, and india-rubber for the cushions. In 1854 a new cushion, possessing great durability and elasticity, was invented by Michael Phelan, the father of billiards in America, and the game in the next half-century attained a wonderfully scientific precision.

The English game is played with three balls, two being white and one red, which generally measures 2 1-16 inches in diameter. One of the white balls has a spot upon it, the purpose of which is that one ball may be distinguished from the other. The red ball is placed upon a spot at what is called the top of the table and about 13 inches from the top cushion, but exactly in the centre width of the table; at the other, or lower end of the table, and at a distance of 2 feet 4½ inches from the lower-end cushion, and exactly in the centre width of the table, is placed a spot and from this spot is drawn a semicircle, with a radius of 21 inches to 23 inches, of which the spot is the center base; the space within the semicircle is called 'balk.' The object of the player is, by striking his own ball against the red ball or his adversary's, to drive either it or them into the pockets, or else effect a 'cannon'—i.e. to strike both balls with the player's ball. The general limit of each game is '50 up,' as it is called, although any number of points may be agreed upon.

The method of play is as follows: for the lead and choice of balls, the players 'string'—i.e., placing their white balls within the semicircle, they cause them to strike the furthermost cushion and to rebound; the striker whose ball stops nearest the bottom cushion may take which ball he likes and play or direct his opponent to play; the red ball must, at the opening of the game, be placed upon the top spot and replaced after being pocketed or forced off the table, or whenever the balls are broken—i.e. when the balls are played as in the opening stroke; the game is adjudged in favor of whoever first scores the number of points agreed upon. Two points are scored for a cannon or carom; two for a white hazard (pocketing the opponent's ball); three for a red hazard (pocketing the red ball). The following strokes count against the player: a simple miss, one point; a losing hazard (pocketing your own ball), two; and doing both at once, three.

Billiard-tables vary in size. The English table is 6 feet wide and 12 feet long and has six pockets, one at each corner and one at each side at the centre; the standard size in America is a table 5 feet wide and 10 feet long, although in public rooms, clubs, and private houses the size generally used is 4 feet 6 inches in width and 9 feet in length. In the United States the game of billiards is now played almost exclusively on carom-tables, pocket-tables being reserved for the game of pool. The bed of the table is made of slate and is covered with fine green broadcloth, while rubber cushions are used at the sides and ends of the table, against which the balls strike and rebound. Three and

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four balls are used in playing the game, the balls being propelled with cues, which are generally made of ash or maple, and in length vary from 4 feet 6 inches to 5 feet. A billiard-cue is about 1½ inches thick at the butt end, while the tip runs to a point, in size from ⅝ to ¼ inch. In weight most cues vary from 14 to 22 ounces. Ivory balls are generally used, and in America and France the standard ball measures 2⅜ inches in diameter, in England 2 1-16 inches.

The original American four-ball game of caroms and pockets was played upon a 6 × 12 table, with six pockets. Two white and two red balls (light and dark in color) 2⅜ inches in diameter were used, but it is so seldom played now that it needs no further notice, its place having been taken by the four-ball carom game, which in turn is giving place to the more popular three-ball carom game. This is played in America and France with two white balls and one red. In professional contests a 5 × 10 carom table is used—i.e. a table without pockets, although it can be played on a table with pockets, counting only the caroms. A semicircle is drawn at the head of the table, with a radius of 6 inches, the base of which is an imaginary line drawn through the centre of the white-ball spot. The billiard-table has three spots in a line, dividing the table lengthwise, running from the centre of the head cushion to the centre of the foot cushion; one of these spots cutting the line in two equal parts, is called the centre spot, and the other two are situated half way between the centre spot and the head and foot cushions. The spot at the head of the table is called the white spot and the one at the foot the red spot. The centre spot is only used when a ball, forced off the table, finds both white and red spots occupied. Should the white ball forced off the table find its spot occupied, it would be placed on the red spot, and *vice versa*. In beginning the game, the red ball and one white are placed on their respective spots; the other white remains in hand and is placed near the white spot previous to the opening stroke in the game. The player can take any position within six inches of the white spot, but he must strike the red ball first before a count can be effected. The cushion-carom game, in which the cue-ball is required to strike one cushion after having hit the first object-ball, is now very general, while the two-cushion and even three-cushion contests are not infrequently played by amateurs as well as professionals.

What has come to be generally known as the 'balk-line game' is a development made necessary by the wonderful skill acquired by the professional players of first rank in 'cushion nursing'; that is, the making of an almost indefinite number of shots by getting the balls against one of the cushions. With the balls in this position such skillful players as Frank Ives, Jacob Schaefer, George Slosson, and others are able to make runs of several hundred, such is their adeptness and delicacy of touch. To guard against this, lines were drawn running parallel to and, at first, eight inches from the cushions and completely crossing the table both ways. The rules of this game provide that the players shall be permitted to make only one or a given number of shots when one or both of the object-balls are between the line and the cushion. The player is permitted to make as many carom shots as he can when the balls are entirely outside the balk-lines, and although this space is, of course, relatively small, the more expert players frequently make runs of from 20 to 30 by extremely delicate carom playing with occasional forcing of one of the object-balls to the cushion with such accuracy as to make it return to a position from which the carom playing may be continued. But with the further development of skill among professional players, this free space was decreased by increasing the distance of the balk-line from the cushions first fourteen and then eighteen inches, while games occasionally provide for a 22-inch balk-line. Again, the restrictions of play within these lines are made more exacting as the skill of the player increases; that is to say, in many of the tournaments between professional players no shot may be counted when the balls are within the balk-lines, unless one is forced over the line.

The only play upon balls against the cushion in most tournaments between professionals is one which provides that both object-balls shall be within what is known as the 'anchor space.' These anchor spaces are rectangles about six inches long and three inches broad, drawn at the cushion line so that the balk-line will divide each into two squares. If the player is skillful enough or fortunate enough to get the two object-balls within this anchor space, he may make one shot, but he must at the same time drive one of the balls outside the space. If his skill is sufficient to make the ball or balls return to this anchor space he may continue his play; but this, as may be supposed, is an exceedingly difficult feat.

Tournaments between professional players are generally arranged with the utmost exactness as to the smallest details of play. In many cases this niceness extends even to a definite requirement as to the temperature of the room in which the contest is to take place. This, because moisture or low temperatures affect the elasticity of the ivory of which the balls are made; therefore the articles of agreement often require that the room shall be kept at a temperature of not less than 80°.

The following are some of the remarkable scores made in recent times, under the modern highly scientific developments: Straight rail—highest run for match play (3 balls, on regulation 5 × 10 table) 1531 points, Maurice Vignaux, Paris, 1880. Highest average for match play, 333⅓, by Jacob Schaefer, Chicago, 1879. Cushion caroms—highest run for tournament play, 85 points, Frank C. Ives, Boston, 1896. Highest average for tournament play, 10 (in 200 points), Jacob Schaefer, Chicago, 1887. Fourteen-inch balk-line—highest run (with 'anchor nurse' barred), 359 points, Frank C. Ives, Chicago, 1894. Highest average (with 'anchor nurse' allowed), 100, Jacob Schaefer, New York, 1893, and Frank C. Ives, Chicago, 1894. Highest average (with 'anchor nurse' barred), 63 2-10, Frank C. Ives, New York, 1894. 18-inch balk-line — highest run for tournament play, 290 points (with 5 shots allowed in 'anchor' spaces), Frank C. Ives, New York, 1896; 140 (with the 'anchor nurse' barred), Frank C. Ives, New York, 1897. Highest average for tournament play, 50 (with 5 shots allowed in 'anchor' spaces), Frank C. Ives, New York, 1896; 40 (with 'anchor nurse' barred), Jacob Schaefer, Chicago, 1898.

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Pool is played with billiard-tables with fifteen numbered balls and one white unnumbered ball. This is the cue-ball. The balls are placed on the centre of the table in the form of a triangle, the apex pointed toward the head of the table. The player's object is to pocket as many numbered balls as he can, the number on each ball he pockets being scored to his credit. Pyramids is also played with fifteen red balls and one white one, the cue-ball. The balls are placed on the centre of the table in the form of a triangle, and the first player must strike them with the cue-ball with sufficient force to cause two or more object-balls to strike a cushion, or one at least to go into a pocket. The following player must distinctly call the number of the ball he intends to pocket, but he need not designate the particular pocket he intends to put it in. In Chicago pool, the fifteen balls are placed at intervals around the cushions. Other pool games, either obsolete or of less importance, are pin pool, two-pin pool, little corporal, red, white and blue, bouchon pool, Parisian pool, high number pool, and pool for 31 points. For the American game, consult: *Modern Billiards*, published by the Brunswick-Balke-Collender Company (New York, 1891); Cady, *Billiards* (New York, 1896); Thatcher, *Championship Billiards, Old and New* (Chicago, 1898); for the English game, Broadfoot, *Billiards* (London, 1896); Roberts, *The Game of Billiards* (London, 1897); for the French game, Vignaux, *Le billard* (Paris, 1889).

BILL IN EQUITY. The original process instituting an action or proceeding in a court of chancery, corresponding to a *declaration* in an action at law, a *libel* in admiralty courts, or (in England) an *allegation* in a spiritual court. It is a complaint in writing addressed to the chancellor, giving the names of the parties to the suit, a statement of the matters on which the complainant relies, the allegations which he makes, an assertion that the matters complained of are contrary to equity, and a prayer for relief. The former practice in the English Court of Chancery was to address the petition to the lord chancellor, lord keeper, or lord commissioners for the custody of the great seal, unless the seal was in the King's hands, or the chancellor was the petitioner, when it was addressed to the King himself—for, according to the theory of chancery, the plea was made to the King's conscience. Where the Crown was the suitor, complaint was by *information* (q.v.). But by the Supreme Court Judicature Act of 1874 all suits now begin by writ. Formerly the several jurisdictions of the United States followed the old chancery pleadings, but in New York and other States which have adopted codes of civil procedure the same pleadings are now established for equity as for common-law actions. Instead of the elaborate bill, the first pleading is now a complaint or petition stating the facts "constituting the cause of action," with demand for judgment. In the non-code States the old bill is retained, though generally with statutory modifications.

A bill may be either original, as when it initiates an action, or not original, as when it supplements an original bill or is brought by a third party intervening in the suit. Bills are characterized according to the nature of the remedy sought, as "bill of peace," "bill of interpleader," "bill of discovery," etc. See CHANCERY; EQUITY; PROCEDURE.

BILLINGS. A city and county-seat of Yellowstone County, Mont., 240 miles east by south of Helena; on the Yellowstone River, and on the Northern Pacific and the Burlington and Missouri River railroads (Map: Montana, E 3). It is the commercial centre for a vast stock-raising district, the exports of which consist principally of live stock and wool, the city being one of the largest inland wool markets of the United States. The wool shipments in 1901 aggregated about 14,000,000 pounds, and live stock, 1700 cars. In the vicinity are deposits of coal, marble, and limestone. The city has a public library, an opera house, a new city hall, and a fine courthouse. Population, in 1890, 836; in 1900, 3221.

BILLINGS, FRANK (1854—). An American physician, born at Highland, Iowa County, Wis. He studied at the Northwestern University Medical School (1881) and took post-graduate work in Vienna and Paris in 1885 and 1886. He was appointed professor of medicine at the Northwestern University Medical School in 1890, and professor of medicine at the Rush Medical College, Chicago, and dean of the faculty of that institution in 1898. He has published the *Year Book on Medicine* (1901), and various monographs on medical subjects in American journals.

BILLINGS, JOHN SHAW (1837—). An American surgeon and librarian. He was born in Indiana, graduated at Miami University in 1857, and at the Medical College of Ohio three years later. He then entered the surgeon-general's department of the United States Army, and during the Civil War served in the field and in hospitals until 1864, when he was transferred to the surgeon-general's office in Washington. There he became curator of the Army Medical Museum and Library and succeeded in making the latter the third largest and probably the most valuable medical library in the world. The *Index-Catalogue* of this library in 16 quarto volumes, which he prepared, is a work of the highest order. Dr. Billings was also for a number of years professor of hygiene in the University of Pennsylvania. On the consolidation, in 1896, of the Astor and Lenox libraries with the Tilden foundation into the New York Public Library, he was appointed chief librarian of the system. He is an active or an honorary member of scientific and learned societies in all parts of the world, notably the National Academy of Sciences and the Royal Medical and Chirurgical Society of London. He received the degree of LL.D. from Edinburgh in 1884, and that of D.C.L. from Oxford in 1889. Among his numerous publications are: *Principles of Ventilation and Heating* (1884); *Mortality and Vital Statistics of the United States* (1885); *National Medical Dictionary* (1889); *Description of the Johns Hopkins Hospital* (1890); and *Social Statistics of Cities* (6 vols. for the Eleventh Census). He has also contributed much to medical and general periodicals.

BILLINGS, JOSH. See SHAW, HENRY W.

BILLINGS, ROBERT WILLIAM (1813-74). An English antiquarian and artist, born in London. He acquired during a seven years' apprenticeship with John Britton, topographical draughtsman, a taste for and facility in the preparation of

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illustrations of historic buildings. Between 1838 and 1849 he produced illustrations of several churches and cathedrals, as well as his *Architectural Antiquities of the County of Durham*. His chief work was entitled *Baronial and Ecclesiastical Antiquities of Scotland* (4 vols., 1845-52), with 240 illustrations. Under his direction the Chapel of Edinburgh Castle and the Douglas Room in Stirling Castle were restored.

BILLINGS, WILLIAM (1746-1800). The first American composer of whom any record is known. He was born in Boston, and set up as a tanner, but subsequently became a singing-master and composer of Psalm-tunes. It is probable that he is correctly regarded as the founder of American church music. Despite a meagre musical training, he evinced some talent for melody, and his collections for church choirs were widely used throughout New England. His patriotic airs, also, were popular among New England troops during the Revolutionary War. Best known of his six compilations were *The Singing-Master's Assistant* (1778), styled 'Billings's Best,' and *The Psalm-Singer's Amusement* (1781).

BIL'LINGSGATE (*Billing*, presumably a former proprietor of the land). A gate, wharf, and fish-market, a little below London Bridge. It was opened in 1558 as a landing-place for provisions, and in 1699 was made "a free and open market for all sorts of fish." The unpolished phraseology, native, though not peculiar, to this quarter of London, has given rise to the use of the name Billingsgate as a synonym for coarse or abusive language, such as is proverbially ascribed to fishwives.

BIL'LINGTON, ELIZABETH, *née* WEICHSEL (1768-1818). A celebrated English singer, born in London. She was the daughter of a German musician. At an early age she came forward as a performer on the piano and as a composer; and after marrying her music-master, Thomas Billington, appeared with brilliant success on the operatic stage in Dublin in 1786. Having returned to London, she was engaged at Covent Garden at the then unheard-of salary of £1000 for the season. She perfected her musical education under Sacchini in Paris, who wrote for her his opera *Inez di Castro*, while she was singing in Naples, 1794. She appeared subsequently in Venice and Rome with the greatest success. After her first husband died, in 1799, she married a Frenchman of the name of Felissent, and returned to London, 1801, where she received £4000 for six months, playing alternately at Covent Garden and Drury Lane. She retired from the stage in 1811, and died at her villa near Venice. Her private life was very stormy, and she was even accused of poisoning her first husband. To a voice of wonderful compass (of three octaves), trained in all the art of the Italian school, she added a fascinating personal beauty and grace. Consult G. F. Ferris, *Great Singers*, Vol. I. (New York, 1892).

BILLITON, bĭ-lē'tŏn', or **BLITONG,** blē-tŏng'. One of the Dutch East India Islands, situated between the islands of Banca (off the southeast coast of Sumatra) and Borneo. It is compact in form and covers an area of 1840 square miles, with a rough surface rising to 3000 feet, and has rich deposits of tin and other minerals. It forms an administrative dependency of Banca, and has a population of (1896) 41,395, of whom many are Chinese, but only about 100 are Europeans (Map: East India Islands, C 5). The chief town, Janjong-Pandang, is on the northwest coast.

BILL OF ATTAIN'DER (for derivation, see ATTAINDER), and **BILL OF PAINS AND PENALTIES.** Bills by which attainder or pains and penalties are inflicted by legislative enactment.

The Constitution of the United States expressly declares (Art. I., Sec. 9) that "no bill of attainder or *ex-post-facto* law shall be passed." (See ATTAINDER.)

In England such bills were formerly generally resorted to when, either from the peculiar nature of the offense, or in consequence of difficulties in the application of the ordinary laws, it was deemed necessary or expedient to inflict such punishment otherwise than through the courts of justice, as in times of public disturbance or when the offense to be punished was not a crime under existing laws. During the reign of Henry VIII., persons of the highest rank were frequently brought to the scaffold by bills of attainder, as the Earl of Surrey, the Earl of Essex, and others, who suffered for denying the King's supremacy. During other reigns, both before and after that of Henry VIII., these bills were more or less in evidence and used, until in 1870, by 33 and 34 Vict. Chapter 23, attainder was practically abolished. There were greater facilities for conviction by this penal legislation than by the ordinary judicial procedure at law; because while in the latter the strict rules of legal evidence must be observed, the injury under a bill of attainder, or of pains and penalties, was entirely in the hands of Parliament, which might dispense at its pleasure with such rules and forms of law as appeared inconvenient or unsuitable to the purpose in hand. Accordingly, in most of the cases to which we have referred, the bills were passed upon evidence which could never have been received as sufficient or even admissible in a court of law; and there are even instances where parties were attainted and punished without there being any evidence against them at all, and even without their being heard in their defense. Under the Stuarts the extraordinary mode of proceeding in Parliament was seldom resorted to, and it has been still more seldom used since the accession of the House of Hanover. In Scotland the Jacobite movement after the union with England was productive of several instances of parliamentary attainder, which, however, resulted merely in the forfeiture of the estates of the attainted parties, and these attainders were likewise unattended with the harsh, and in too many instances capital penalties, which were formerly the inevitable results of treason so discovered. The last instance of bill of attainder for treason was that of Lord Edward Fitzgerald, one of the leaders of the Irish Rebellion of 1798. In regard to bills of pains and penalties, perhaps the two most remarkable instances are those of Bishop Atterbury, in 1722, and of Queen Caroline, wife of George IV., in 1820.

The proceedings of Parliament in passing bills of attainder and of pains and penalties do not

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vary from those adopted in regard to other bills. But the parties affected have generally been admitted to defend themselves by counsel and witnesses before both houses. In impeachments, the Commons are accusers and prosecutors and the House of Lords alone are judges of the crime. In passing bills of attainder, the Commons are judges of equal jurisdiction and with the same responsibilities as the Lords; and the accused can be condemned only by the joint assent of the Crown, the Lords, and the Commons. In passing bills of attainder, the bishops, contrary to the practice in capital impeachments, take part in the proceedings and vote. In parliamentary attainders, the bill sets out, by way of preamble, the facts and evidences on which it is founded, and concludes, by way of enactment, that the accused "is hereby convicted and attainted of high treason, and shall suffer the pains of death, and incur all forfeitures as a person attainted of high treason." See PARLIAMENT.

BILL OF COSTS. In England, the itemized statement of account for services rendered by a solicitor (q.v.) or attorney (q.v.) to his client. It is customary to render the items of this account in great detail, and it thereupon becomes the basis of the claim which the law gives the solicitor upon his client. Barristers (q.v.) have no legal claim for conpensation, and hence are not privileged to render bills of costs.

In the United States, a bill of costs is an itemized statement of the statutory or other fixed costs of a suit, filed by the successful party, with the judgment. The bill is usually 'taxed,' i.e. verified and allowed, by the clerk of the court in which the judgment was rendered, and its amount thereupon becomes a part of the judgment. See COSTS.

BILL OF CREDIT. In mercantile law, a letter of credit (q.v.); in the constitutional law of the United States, paper money. The issue of such bills of credit by the several States is expressly prohibited by the Federal Constitution.

BILL OF EXCEPTIONS. A formal statement, for the purpose of a writ of error or appeal to a court having the proper jurisdiction by way of review, of the exceptions taken, or objections raised, to the rulings or decision of the trial court upon points of law. The object of a bill of exceptions is to bring the points complained of before the proper court for review and possible reversal of the decision.

BILL OF EXCHANGE. An unconditional order in writing, addressed by one person to another, signed by the person giving it, requiring the person to whom it is addressed to pay on demand, or at a fixed or determinable future time, a sum certain in money to, or to the order of, a specified person, or to bearer. Such is now the statutory definition in Great Britain, in more than forty of her colonies, and in about twenty jurisidictions of the United States. An inland or domestic bill is one which purports to be drawn and payable within a particular State. A foreign bill is one drawn in one State upon a person in another. For this purpose, our States and Territories are deemed foreign to each other. While no set form of words is required to constitute a bill of exchange, an inland bill is ordinarily in the following form:

$500

NEW YORK, March 4, 1901.

Sixty days after date pay John Smith, or order, Five Hundred Dollars, value received, with interest, and charge to account of JOHN JONES.

To

JAMES LAMB, Albany, N. Y.

Accepted, James Lamb.

Foreign bills are often drawn in a set of three, numbered respectively, first, second, and third. The following is a common form of the first of such a set:

£100.

NEW YORK, March 4, 1901.

At sight of this first of Exchange (second and third unpaid) pay John Smith, or order, One Hundred Pounds, value received, with interest, and charge to account of JOHN JONES.

To

JAMES LAMB, London.

Accepted, James Lamb.

Bills of exchange are of comparatively modern origin, having been used by the Florentines in the Twelfth, by the Venetians in the Thirteenth, and introduced into England during the latter part of the Fourteenth Century. They were used in England but little until the Seventeenth Century, the first reported case in the courts of that country occurring in 1603. Originally, a bill of exchange was employed to avoid sending money from one country to another. If a London merchant, A, owed a debt in Amsterdam, he went to B in London, to whom money was owing from C in Amsterdam, paid to B the amount of the debt and received from him a bill of exchange on C directing him to pay that amount to A's creditor in Amsterdam, D, and charge the same to the drawer's account. Thus the London merchant, A, would pay his Amsterdam creditor, D, without sending any money out of the country. It will be noticed that a bill of exchange represented a trade transaction, was drawn by a creditor on his debtor, and for money paid to the drawer by the payee or by the payee's debtor. Such is still the character of a bill in France, where the nature of the value for which it is given must be expressed, and a false statement on this point avoids the instrument in the hands of any holder with notice. In Great Britain and the United States, on the other hand, a bill of exchange need not represent a trade transaction, and is frequently issued as a mere instrument of credit. The acceptor, the drawer, or an indorser may put his name on the bill, not because he has received the value named therein, but simply for the accommodation of some other party; that is, for the purpose of lending his credit to such accommodated party. In other words, bills of exchange have come to perform the functions of a paper currency.

The liability of the various parties to a bill may be stated briefly as follows: The drawee is under no obligation on a bill, until he accepts it; that is, until he formally assents to the order of the drawer. An oral acceptance was held valid at common law, and this rule obtains in some of our States; but in others, and in Great Britain, under the statutes, it must be in writing and signed by the drawee. This statutory requirement is satisfied by the drawee's signature across the face of the bill. The holder of a bill is entitled to insist that the acceptance shall be an

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unqualified assent to the drawer's order. If it is qualified in any respect, as if the assent is subject to some condition, or is to the payment of a part only of the amount of the bill, the holder may refuse to take it and treat the bill as dishonored. If he does take such a qualified acceptance, he discharges the drawer and indorsers from liability on the bill, unless they assent thereto. By accepting the bill, the drawee (thereafter called the acceptor) engages absolutely to pay it; and no demand need be made on him as a condition of suing him thereon. Nor will the fact that he received no consideration for accepting the bill be a defense for him against a holder for value, for the latter has been induced to give value for the bill by the acceptor's engagement to pay. It is a good defense, however, as against any one but a holder for value, or one claiming through such holder; the rule being that every negotiable instrument is presumed to have been issued, and every contract thereon, whether of acceptor, drawer, or indorser, made for a valuable consideration; but that this presumption may be rebutted in an action brought by any one who has not paid value for the bill, or has not obtained title through a holder for value. The acceptance of a bill operates as a conclusive admission by the acceptor of the genuineness of the drawer's signature, of his capacity and authority to draw the bill, of the existence of the payee, and of his then capacity to indorse it; but it is not an admission that the body of the bill is genuine, nor that the indorsement of the payee is genuine.

The liability of the drawer and of indorsers is conditional, not absolute. The drawer admits the existence and capacity of the payee, and engages that the bill shall be accepted and paid by the drawee upon due presentment, and if it is dishonored and proceedings thereon are taken, he will pay it to the holder or to any indorser who may be compelled to take it up. Every indorser engages: that the instrument is a genuine, valid, and subsisting bill, to which he has a good title; that all prior parties were capable of contracting; that if accepted it shall be paid, or if not accepted, that it shall be accepted and paid upon due presentment, and if it is dishonored and due proceedings thereon are taken, that he will pay it to the holder, or to any indorser subsequent to himself who may be compelled to take it up.

Whether a bill must be presented for acceptance depends upon its form. If such presentment is necessary to fix the maturity of the bill, as when it is payable after sight, or if the bill stipulates that such presentment shall be made, or when the bill is made payable elsewhere than at the residence or place of business of the drawee, it must be presented for acceptance. If so presented, and acceptance is refused by the drawee, the holder, upon taking due proceedings of dishonor, has an immediate right of recourse against the drawer and indorsers, and need not present the bill thereafter for payment. If the bill is accepted, then due presentment for payment must be made, in order to fix the liability of drawer and indorsers. It is impossible, within the limits of this article, to state the various rules governing the time and manner of presentment of bills, and the proceedings of dishonor to be taken by the holder in order to secure his right of recourse against the drawer and indorsers. For these, the reader is referred to law treatises on the subject, or to the Negotiable Instrument Law which has been enacted in a number of our States. (This statute is Chap. 612 of the Laws of New York, 1897; Chap. 74, Laws of Connecticut, 1897.) The negotiability of a bill of exchange will be dealt with in the article on NEGOTIABLE INSTRUMENTS. See NEGOTIABLE INSTRUMENTS, and the authorities there referred to.

BILL OF HEALTH. A statement by the captain and surgeon of a ship with regard to the health of the crew and passengers, which is presented to the health officer at the port of debarkation, who, after examination, decides whether or not the vessel shall be permitted to pass quarantine (q.v.). A false return is severely punished. A *clean* bill is one that reports no case of infectious disorder; a *foul* bill is one that makes it dangerous for the public health to permit the passengers to land without further precautions. A *suspected* bill (also known as a *touched* bill) is one that reports the rumored prevalence of infectious disease at the port of embarkation. A bill of health is sometimes attested by the consul at the place of sailing.

BILL OF INDEMNITY. In England, an act passed by Parliament every session for the relief of those who have unwittingly or unavoidably neglected to take the necessary oath required for the purpose of qualifying themselves to hold their respective offices. In the United States, this term is used of an act of Congress passed to legalize the action of any official who, under the stress of necessity, has exceeded his statutory authority. At the time of the yellow-fever epidemic at the South in 1853 the Secretary of War ordered the distribution of tents and rations to the sufferers, though under the law he had no power to do so; but as soon as Congress reassembled it passed an act legalizing the order. The name is also applied to a vote of money to reimburse one who has at his own risk incurred expenses on behalf of the Government or the nation.

BILL OF LADING. A written instrument issued by a common carrier, reciting that he has received certain goods, which he agrees to transport from one place or another and to deliver to a designated person or assigns, for such compensation and upon such conditions as are stated therein. Originally, bills of lading were issued only by ship-owners or carriers by water. Now, they are employed by every class of carriers.

As a receipt, the instrument may be modified and even contradicted by oral evidence, so far as the immediate parties are concerned. If, however, a third party has bought and paid for the goods referred to in the bill of lading, relying upon the truth of its statements, the carrier is estopped (see ESTOPPEL) from showing that those statements are incorrect. Whether he is so estopped when the bill of lading is issued by his agent without the receipt of any goods is a question upon which the courts are divided. It is held in England and in the United States Federal courts, as well as in some of the States, that he is not estopped. These tribunals declare that the master of a vessel, or the similar agent of a land carrier, has no authority to sign a bill of lading on his principal's behalf for goods not actually received by him, and, therefore, a ficti-

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tious bill of lading does not bind his principal; that it is absolutely void. On the other hand, many American courts hold that the carrier is estopped, on the ground that when a "principal has clothed his agent with power to do an act upon the existence of some extrinsic fact, necessarily and peculiarly within the knowledge of the agent, and of the existence of which the act of executing the power is itself a representation, a third person dealing with such agent in entire good faith, pursuant to the apparent power, may rely upon the representation, and the principal is estopped from denying its truth to his prejudice."

If the bill of lading is intended to contain in itself all of the agreed terms of the contract of carriage, oral evidence cannot be given to vary or contradict the written instrument; but if it does not purport to be the whole contract, the unincluded terms may be shown by oral evidence. When the bill of lading does contain the whole contract, the proper party to sue the carrier upon it, at common law, is the shipper or consignor, whether he is the owner of the goods or not; nor could the assignee of a bill of lading, in his own name, sue the carrier on the contract.

While the contract was not assignable at common law, the indorsement of the bill of lading could operate to transfer the title to the goods represented. This symbolical character of a bill of lading originated in the fact that while a cargo is at sea it is incapable of physical delivery. Persons could sell and deliver goods during their transit only by treating bills of lading as symbols of the goods themselves. Hence the law merchant recognizes the delivery of a bill of lading as the legal equivalent of the delivery of the goods; and this rule of the law merchant was adopted by the common law. But bills of lading are not negotiable for all purposes. A shipper can give no title to the goods represented by a bill of lading by indorsing or transferring it, unless he is their owner, or has apparent authority from their owner. Nor can a finder or a thief of a bill of lading indorsed in blank confer even upon a *bona-fide* purchaser a better title than he has. In other words, the negotiability of a bill of lading is substantially that of a bill of exchange (see BILL OF EXCHANGE) which is overdue; the indorser takes it subject to equities. In two respects, however, the *bona-fide* indorsee of a bill of lading has greater rights over the goods than his indorser had; he can hold them free from an unpaid vendor's right of stoppage *in transitu* (see STOPPAGE IN TRANSITU), and free also from a defrauded vendor's right to rescind the contract of sale and retake the goods. This semi-negotiability of a bill of lading continues until a complete delivery of possession of the goods has been made to some person having a right to claim them under it.

Bills of lading are made, as a rule, in two or more parts; a practice which enables dishonest shippers to use them as instruments of fraud, by selling the various parts to different purchasers for value. In such a case, the purchaser, to whom the transfer of one part is first made, becomes the owner of the property. Still, the carrier may safely deliver the property to the one who first presents a part of the bill of lading if he has no notice or knowledge of a claim by the holder of another part; although the one so receiving delivery may be compelled to surrender the goods to other holders. In some States, bills of lading have been declared by statute to be negotiable, like bills of exchange. But such legislation has not transformed and cannot transform documents of title to goods into fully negotiable instruments. Consult Scrutton, *Contract of Affreightment as Expressed in Charter Parties and Bills of Lading* (4th ed., London, 1899), and the authorities referred to under the title COMMON CARRIER.

BILL OF MORTALITY. A list, issued weekly, of births and deaths occurring within the limits of London, the publication of which began in 1592. Such bills are now superseded by the weekly bills prepared at the Register General's office.

BILL OF PAINS AND PENALTIES. An act of the Legislature, declaring a certain act to be a crime, and imposing punishment or a disability upon such as have previously committed the act. It differs from other penal legislation in that it is retroactive in its operation, making that to be an offense against the State which was not so at the time of its commission, or imposing a penalty which the offense did not involve when committed. Strictly speaking, it comprehends the bill of attainder; but, as commonly employed, it is limited to cases in which any penalty less than death is imposed by the statute, whereas the bill of attainder always creates a capital offense. (See ATTAINDER.) Bills of pains and penalties are in general prohibited by the clause of the Constitution of the United States forbidding Congress and the several States from passing bills of attainder or *ex post facto* laws (Art. I., Sec. 9). But where the crime of treason, as defined in the Constitution, has been committed, Congress may, by a bill of pains and penalties, declare its punishment, so long as the attainder declared by the bill does not involve corruption of blood or forfeiture of estate beyond the life of the traitor (Art. III., Sec. 3). See BILL OF ATTAINDER; TREASON.

BILL OF PARTICULARS. A written statement of the items of the demand upon which the plaintiff founds his action or the defendant his set-off or counterclaim. In some jurisdictions it must be filed with the pleading of the party; in others, only on request of the opposite party, or in response to an order of the court. It is generally conclusive on the party furnishing it. Consult the authorities referred to under the title PRACTICE.

BILL OF PEACE. A bill of complaint in equity to restrain repeated attempts to litigate the same cause of action. The objects of the proceeding are to suppress useless and oppressive litigation, and to prevent a multiplicity of suits, and this procedure may accordingly be resorted to: (a) where a numerous class of persons insist upon the same legal right arising out of the same transaction; and (b) where the same individual persists in renewing repeatedly an unsuccessful action. The remedy is by injunction forbidding the prosecution of the vexatious suits. See BILL; CHANCERY; EQUITY; QUIA TIMET.

BILL OF RIGHTS. An act of Parliament passed in 1689, immediately after the accession of William and Mary, and embodying the fundamental principle of political liberty as understood in England. It condemns as unconstitu-

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tional certain abuses of the royal power that had characterized the reign of the preceding sovereign, James II.—the suspension of acts of Parliament by royal prerogative, the levying of taxes without consent of Parliament, the maintenance of a standing army in time of peace, interference with the administration of justice and free elections, the infliction of unusual punishments, the exaction of excessive bail, and the denial of the right of petition. It then affirms the freedom of debate in Parliament, the freedom of elections, and the freedom of petition. In France, bills of rights were frequently enacted after the revolution of 1789. The name is commonly given to the first ten amendments to the Constitution of the United States, proposed in the first Congress that met after the adoption of the Constitution itself and ratified by the necessary number of States in December, 1791. They appear to have been added in order to satisfy the objection made by many that the Constitution itself was not sufficiently specific in defining the rights of the citizen. See RIGHTS, DECLARATION AND BILL OF.

BILL OF SALE. A formal written conveyance, generally, but not necessarily, under seal, of a right to or interest in personal property. It should contain a description of the parties and property sufficient for identification; and in delivery it effects transfer of title from vendor to vendee. A bill of sale is the instrument used commonly in the sale of household furniture, the stock, fixtures, and good will of a business, and especially in the transfer of ownership of ships, which, if the ships be registered, must, under both the English and United States laws, be made by bill of sale (English Merchant Shipping Act, 1854, Sec. 55; U. S. Rev. Stats., Sec. 4170). If the property is delivered when sold or a part of the purchase-money is paid, a bill of sale is unnecessary to make a valid transfer, but is a convenient evidence of title. The instrument alone is insufficient without delivery of the property to protect the purchaser against the creditors of the seller, though under the registration laws of the United States this protection may generally be secured without transfer of possession by filing or recording the bill of sale. Bills of sale may be absolute or conditional. The latter operate as security and are generally considered chattel mortgages (q.v.) in American law. See SALE.

BILL OF SIGHT. A document signed by or on behalf of an importer of goods in England, who does not possess a sufficiently accurate knowledge of their quantity or quality to enable him to make a perfect entry of them. In this document, the importer gives the best description of the goods that is practicable. It is then presented to the collector of customs, who is authorized, upon its receipt, to have the goods landed and examined by the importer in the presence of customs officers; after which the importer must make a perfect entry within a limited period, or the goods are sold to pay duties and charges. Somewhat analogous provisions for expediting the delivery of parcels and packages are contained in Secs. 2853-2858, 2990-2997, and Chap. 371 of Laws of 1896 (29 United States Stations at Large, 263).

BILLON, bē'yŏn' (Fr., copper coin, base coin, OF. *billon*, mass; cf. *bullion*). An alloy of silver with copper, in which the copper predominates. Billon was formerly much used in Germany and in Austria for coins of smaller denominations, in order to avoid the bulkiness of copper.

BILLOT, bē'yō', JEAN BAPTISTE (1828—). A French general, born at Chaumeil (Corrèze). He was admitted to the military academy at Saint Cyr in 1847, was advanced to the rank of lieutenant in 1852, captain in 1854, lieutenant-colonel in 1869, and colonel in 1870. After a period of service in Mexico and Algeria he was appointed to the command of a division of the Second Army Corps (l'Armée du Rhin) upon the outbreak of the Franco-Prussian War, and participated in the battle of Spichern, and in the defense of Metz. Afterwards he became commander of the Eighteenth Army Corps, and rendered distinguished services at Baune la Rolande and Villersexel, where the French Army gained one of the few victories of the war. He was minister of war in the cabinets of Freycinet (1882-83) and Meline (1896-98).

BILLROTH, bĭl'rŏt, THEODOR (1829-94). A German surgeon. He was born at Bergen, on the island of Rügen, and studied medicine at the universities of Griefswald, Göttingen, Berlin, and Vienna. He was the assistant of Langenbeck at Berlin, and was appointed professor of surgery at the universities of Zürich (1859) and Vienna (1867). Billroth was one of the greatest operators of modern times, and one of the foremost promoters of histology, pathology, and military surgery. His publications include the following valuable contributions to medical literature: *Die allgemeine chirurgische Pathologie und Therapie* (translated into nearly all the principal languages of Europe, as also into the Japanese, 1863, 15th ed., 1893); *Chirurgische Briefe aus den Kriegslazaretten in Weissenburg und Mannheim* (1870-72); *Ueber den Transport der im Felde Verwundeten und Kranken* (1874); *Die Krankenpflege im Haus und im Hospital* (1900).

BILNEY, bĭl'nĭ, or **BYLNEY,** THOMAS (1495?-1531). An English martyr. He was born probably at Norwich; studied at Trinity Hall, Cambridge, and in 1519 was ordained priest. After a study of Erasmus's Latin *New Testament* (1516), he denounced the scholastic doctrine of 'good works,' as well as saint and relic worship, and pilgrimages to Walsingham and Canterbury. He was arraigned before Cardinal Wolsey in 1527, and, having recanted, was absolved, but confined in the Tower until 1529. In 1531 he began field preaching in Norfolk, but was soon arraigned, condemned as a heretic, and burned at Norwich.

BILOXI, bĭ-lŏks'ĭ. A city in Harrison County, Miss., 60 miles southwest of Mobile, Ala.; on Biloxi Bay, extending from the Gulf of Mexico, and on the Louisville and Nashville Railroad (Map: Mississippi, H 10). A popular resort, it has a beach six miles long, fine shell-paved streets, and beautiful surroundings. A Federal building, to cost $150,000, and improvements on the channel to secure a deep-water harbor, are projected for the immediate future. Biloxi is the centre of an extensive canning industry, including oysters, shrimp, crabs, fruits, and vegetables; and has shipyards, ice factories, and manufactures of lumber in various products. In 1699 Iberville (q.v.) established a settlement at

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a point across the bay from the present city and named it Biloxi, from the Biloxi Indians. He also built near by a fort (Fort Maurepas), which was the first French fortification in this part of the country. In 1701 the settlement (now known as Old Biloxi) was abandoned because of a destructive fire, and about 1712 a permanent settlement, the first within the present limits of Mississippi, was made on the present site. For several years in the early part of the Eighteenth Century, Biloxi was the capital of the French territory in this part of North America. It was incorporated as a town in 1872 and as a city in 1896, the date of the charter now in force, which provides for a mayor, elected every two years, and a city council. Population, in 1890, 3234; in 1900, 5467. For the history of Old Biloxi (1699-1701), consult French, *Historical Collections of Louisiana.*

BILOXI. A small tribe of Indians, originally residing about Biloxi Bay, on the Gulf coast of Mississippi, whence they removed to Louisiana, probably early in the Eighteenth Century. From their geographic position and alliances it was long assumed that they were related to the Choctaws, but in 1886 Gatschet discovered a few families in Louisiana still speaking their language, and demonstrated that it is a detached dialect of the great Siouan stock.

BILSE, bil'se, BENJAMIN (1816—). A German musical conductor, born at Liegnitz. He became conductor of the orchestra in his native city and brought it to such a degree of perfection that in 1867 he could undertake to give orchestral performances in Paris during the exhibition. From 1864 to 1884 he was established at the Concerthaus, Berlin, where his popular concerts attracted large audiences. With his orchestra of seventy members he undertook several tours through Germany, Belgium, northern France, and Poland, and also visited Saint Petersburg. His repertory was very extensive.

BILSTON, bil'ston. A town of Staffordshire, England, situated on rising ground, about 2 miles southeast of Wolverhampton (Map: England, D 4). It forms a part of the parliamentary borough of Wolverhampton. It has extensive iron and coal mines, iron-smelting works, iron foundries for making machinery, besides works for manufacturing tin-plate goods, japanned and enameled wares, nails, wire, screws, and coarse pottery. Fine sand, adapted for metal-casting, is found here. The municipality owns and operates its water-works and maintains public baths and parks. Population, in 1891, about 23,500; in 1901, 24,000.

BIMA, bē'mâ. See BHIMA.

BIMBASHI. See BASHI.

BIM'BISA'RA. A king of Magadha, the modern Bihar, one of the earliest friends and protectors of the Buddha, whom he presented with the famous pleasure-park, *Veuvana.* Bimbisara reigned in the Sixth Century B.C. for fifty-two years, and he was murdered by his son, Ajataśatru. According to other accounts, however, Bimbisara reigned only twenty-eight years.

BI'MELER, J. M. See BÄUMELER, JOSEPH MICHAEL.

BIMETALLISM (Lat. *bis,* twice + *metallum,* metal). The name given to a monetary system in which both gold and silver stand upon precisely the same footing as regards mintage and legal tender. The practical difficulties which in times past have confronted the maintenance of a concurrent circulation of the two metals have led one nation after another to abandon the effort, and to adopt a system of monometallism, with gold as its basis. The historical development of coinage in modern nations has been from silver monometallism through a more or less unsatisfactory experience with bimetallism to the single gold standard.

The English monetary notation with the pound as the unit recalls the origin of English money, with a pound of silver as its basis. By successive debasements the coinage of the monetary pound parted company with the pound weight, until, in the time of Elizabeth, the pound weight of silver was coined into 62s. instead of 20s. Gold coinage had been introduced by Edward III., but a long course of experimentation, often of a most arbitrary nature, both with the silver coinage and the gold coinage, had failed to accomplish any satisfactory adjustment of their mutual relations. During this whole period silver was in theory the standard coin of the realm, and was so considered when William III., in 1699, completed the recoinage of the silver coin. His Government fixed the value of the guinea at 21s. 6d., but as this overrated gold, the silver coinage, in excellent condition from its recent passage through the mint, was rapidly exported, and the loss of the small change caused great inconvenience among the people. On the advice of Sir Isaac Newton, then master of the mint, the guinea was in 1717 declared to be equal in value to 21s. This mitigated the evil, but did not remove it. Silver could be freely minted, as before, but since its market value was higher than its legal value, it was not carried to the mint. For all larger payments gold became the exclusive medium of exchange, for there was scarcely enough silver to meet the needs of retail trade. During the course of the century the stock of silver coin was not replenished, and the money in circulation became extremely abraded. This depreciation of the coin led, in 1774, to the law that in sums of £25 and upward silver should be legal tender by weight only, and not by tale. By the coinage law of 1816 silver was reduced to the place of a token coinage. By that law, 66s. were to be coined from the pound weight of silver, though the mint price paid to individuals remained, as before, 62s. for the pound. This threw the coinage of silver in fact upon the Government, and by the coinage act of 1870 the right of individuals to take silver to the mint for coinage was abolished. By these successive steps England legalized the single gold standard, which had in fact been in operation since 1699 at least.

Other nations were slow to follow this example. By the monetary law of 1801 France contemplated the 5-franc silver piece as the standard money, but in fact established a bimetallic system. In the first half of the century silver remained the usual currency of the country; but after the discovery of gold in California and Australia and the fall of the price of gold relatively to silver, the French law favored the coinage of gold. Silver disappeared from circulation, and the lack of small change led in 1860 to the reduction of the smaller silver coins to tokens by increasing the percentage of alloy. Similar

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but not uniform action by contiguous countries which used the same coin, and were accustomed to regard all francs as identical, irrespective of the heads upon the coins, led to much inconvenience, and finally, in 1865, to the Latin Monetary Union for a common basis of coinage among nations using the franc system. The 5-franc piece, then little coined, was not disturbed, but the subsequent fall in the price of silver led to such excessive and unequal coinage by the several States composing the Union, that agreements were entered into restricting, and finally abolishing, in 1877, the further coinage of the 5-franc piece. By this action, France, Belgium, Switzerland, Italy, and Greece were added to the ranks of the gold-standard nations. Germany, which had been exclusively upon a silver basis until 1871, in that year adopted the gold standard as one of the elements of the unification of the coinage following the establishment of the Empire. Indeed, her action in throwing her stock of silver in the following years upon a market which was already falling, is deemed to have been an important factor in leading the Latin Union States to abandon silver. The Scandinavian countries and Holland followed the example of their neighbors in the seventies, while Russia and Austria, then in the toils of a paper currency, were unable to take such action until the close of the century.

The United States until the outbreak of the Civil War had been legally upon a bimetallic basis. As in France, the outflow of silver following the gold discoveries of the middle of the century had led to laws making the silver fractional coins tokens of limited legal tender. In the revision of the coinage laws in 1873, when we were yet upon a paper basis, the silver dollar was dropped from the laws, and gold became the nominal standard. With the return to a metallic currency, a reaction in favor of silver set in. Various unsuccessful attempts were made to reëstablish the free coinage of the silver dollar. The strength of the silver advocates was sufficient to bring about a series of compromise measures which, without removing all restrictions upon the coinage of silver, materially increased the volume of silver in the circulation of the country, and at times threatened the maintenance of the gold standard. The law of 1878 provided for the purchase of not less than two million dollars' worth of silver monthly nor more than four million dollars' worth, and the coinage of the bullion thus purchased into silver dollars of 412½ grains standard silver nine-tenths fine. Under this law nothing more than the minimum amount was purchased and coined. In some respects the law of 1890 went further in providing that the Secretary of the Treasury should purchase monthly 4,500,000 ounces of silver bullion and issue Treasury notes for the purchase price of the same. Both the silver dollars and the Treasury notes of 1890 enjoyed the full legal-tender quality. The policy of purchasing silver was abandoned in 1893. In 1896 the Presidential election hinged upon the declaration of the Democratic platform in favor of the free coinage of silver by the United States in the ratio of 16 to 1. The defeat of the Democratic candidate and subsequent adoption of the currency law in 1900 still further strengthened the gold standard legislation of the nation. These, with the cessation of silver coinage in India, and the adoption of the gold standard by Japan, are in brief the salient features of the history of the standards among modern nations. For a more detailed account of the historical aspects of the case, the reader should consult the articles LATIN UNION; MONETARY COMMISSIONS; MONETARY CONFERENCE; and MONEY.

The arguments advanced by the advocates of the opposing systems may now be passed in review. In the first place, it should be stated that in its modern form the question of bimetallism is one of standards and not of circulation. If in earlier days the problem was to secure the concurrent circulation of gold and silver coin to meet the needs of wholesale and of retail trade, this aspect of the question is no longer important, for means have been found to insure this result without a resort to bimetallism. Almost equally irrelevant is the objection often heard to the use of silver as standard money because of its bulk and weight. This is an objection perfectly well founded, to be sure, against the circulation of silver coin, but not against silver as standard money. For silver money may and does circulate through its paper representatives, as the notes of the Bank of France or the silver certificates of the United States amply testify. In the same line of argument, the contention that bimetallism exists everywhere in fact, because wherever gold is used, silver must also be used in the monetary circulation, has no bearing upon the controversy. Only the most inexperienced in monetary affairs would attach the name bimetallism to the circulation of the two metals side by side, irrespective of the laws which govern their coinage. For it is the essence of bimetallism, as appears in our definition, not simply that both metals should be coined, but that both should be coined on precisely the same legal footing, and possess the same legal-tender qualities. They may circulate together, yet stand upon a wholly different basis. Thus, in the United States, the subsidiary silver coins are limited both in amount and in legal tender, while the silver dollars, though unlimited in legal tender, are limited in amount. Both stand obviously upon a wholly different footing from gold, which not only possesses unlimited legal tender, but which can be coined at the instance of individuals without restriction of amount. It is that element in the metallic currency which is freely expansible by law which gives the standard.

The advocates of bimetallism have laid stress upon two results which they say would follow the adoption of their system: (1) The regulation of exchanges between the various nations; (2) the attainment of a more stable standard of value. They point out that the use by some nations of gold and others of silver as the monetary standard produces a fluctuating par of exchange between gold and silver nations which impedes commerce and causes great uncertainty in their mutual relations. To the extent that uncertainty prevails as to the return when the prices attained in one country are translated into the standard of the country which has sold the goods, to that extent is trade rendered difficult. The liability to loss through exchange enhances the prices of goods sold. It is further pointed out that the varying tendencies of prices under one standard, as compared with another, acts as an unnatural impediment or stimulus to trade. If gold prices and the gold price of silver fall alike,

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silver-using nations may export to gold countries without any loss, while gold countries find prices falling. Thus, if wheat falls in price in England, exporters in India suffer nothing, while exporters in the United States must be content with lower prices. A fall in the gold price of silver accompanies a fall in the prices of other commodities in gold countries, but the relation of silver to commodities remains the same, and no enhancement of general prices ensues in silver-using countries.

A more important tenet of the bimetallic creed is that such a system produces a more stable standard of value. The evils of instability in the monetary standard are thoroughly conceded by all parties. As illustrated in the fluctuating fortunes of paper money, they are patent to all. Under a metallic system, changes in the value of the standard are more gradual and less revolutionary in their effects. Yet they exist, none the less, and reveal themselves in the ups and downs of general price movements. It is only after some study that persons understand that prices and the value of the standard are reciprocals; that low prices mean a high value of money and high prices a low value of money. The economic effects of changes in the value of money must be studied in the effects of price-changes. Downward movements representing an enhanced purchasing power of money redound to the benefit of creditors and bear heavily upon debtors, who require a larger produce to fulfill their obligations. Upward movements lighten the burden of the debtor, while they shrink the purchasing power of what the creditor receives, and thus work to his injury. Such changes are not without profound effects upon the general conditions of trade and industry. Bimetallism proposes to eliminate in a large measure these evils, furnishing a more stable standard. Instability of the standard rests upon the fluctuations in the production of the metals. It is argued that by uniting in the monetary standard two metals instead of one, the fluctuation in the production will be diminished. The aggregate product is less likely to vary than is the product of each, the changes in the production of the one being offset by changes in the production of the other.

In reply to these claims and assertions, the gold monometallists have taken several positions. In the first place, some have contended that the evils which bimetallists seek to redress are of no great consequence. In the second place, others have contended that as a plan of relief bimetallism is out of the question because it will not work in practice. And finally, granting the possibility of bimetallism, it is claimed that we have no guarantee that it would actually relieve the situation.

It is an extreme view that the changes in prices, which constitute the chief stay of the bimetallic argument, have no relation to the money supply. If this, however, be true, a system which, like bimetallism, aims at working upon prices through the money supply is useless. If this extreme view has not been adopted by all monometallists, it is yet represented. Another and somewhat more moderate view of the same proposition is the claim that such changes in prices have worked far less disturbance than the bimetallists have claimed, and that if they involve some disadvantages, they have some compensations which the bimetallist in his ardor has overlooked.

More important, and occupying a larger place in the bimetallic controversy, is the standpoint that bimetallism will not work; that no legal enactment can so fix the relative values of silver and gold as to insure their concurrent circulation. In this view bimetallism is not a double standard, but an alternating standard. Divergencies between the legal ratio and the market ratio being bound to occur, Gresham's Law immediately enters into operation. The more valuable metal is no longer brought to the mint, and the existing stock in the circulation is exported. Monometallists claim this to be inevitable. They tell us that law cannot fix values; that the relative value of gold and silver in the market will be fixed by commercial considerations, especially by the cost of production. Any attempt on the part of governments to interfere with the operations of these laws must be fruitless. To these considerations the bimetallist replies by calling attention to the predominating influence of demand as a factor affecting the value of the precious metals. He points out that as the existing stock is much greater than the annual accretions, the cost of producing these cannot be the sole criterion of the value of the mass. He points out further that the demand for the use of the metals as money far outstrips any other demand. He therefore concludes that law can and does affect the value of the metals and is competent to fix the rates between them; that if the monetary demand thus created be strong enough, the commercial ratio must adjust itself to the legal ratio. Both sides of the controversy appeal to the facts of history as bearing out their contentions. On the one hand, the monometallist points to the fact that the French law of 1801 which established the legal ratio of 15½ to 1 between gold and silver did not control the market ratio, but there was always a divergence between them, leading now to a preference for gold and now to a preference for silver in the French coinage. The bimetallists concede that such divergence might have prevented both silver and gold being carried to the mint at the same time; that they might have determined which of the metals would be preferred for export; but they strenuously deny that they caused the export of one metal or the other. If the French law gave but an imperfect picture of the workings of the bimetallic system, it is only a proof to the advocates of the latter that the area within which it worked was too restricted. Enlarge the scope of the law by an international agreement embracing the leading commercial nations, and it would, they claim, be proof against fluctuations of ratio. Hence the agitation for a bimetallic standard has been for an international bimetallic system.

Finally, the monometallists are frequently willing, for argument's sake, to concede the practicability of bimetallism, that they may put the further question, What would be gained? The evil to be remedied is an unstable standard. What guarantee have we that two metals would be better than one? The bimetallists claim a compensatory action; that irregularities in the supply of one metal will outbalance those of the other. They assert that a greater stability would follow the introduction of their system from the fact that by distributing the variation over a

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wider area, the full supply of both metals offering a much more extensive surface, the effect would be far less perceptible. "Imagine," says Professor Jevons, "two reservoirs of water, each subject to independent variations of supply and demand. In the absence of any connecting pipe, the level of the water in each reservoir will be subject to its own fluctuations only. But if we open a connection, the water in both will assume a certain mean level, and the effects of any excessive supply will be distributed over the whole area of both reservoirs." They point to the experiences following the discovery of gold in the middle of the century as proof. In 1846 gold was produced to the extent of $30,000,000 and silver to that of $32,500,000. In 1852 the figures were, for gold $150,000,000, and for silver $42,500,000. In other words, gold was advanced fivefold, but the combined product of gold and silver only threefold. This moderated the effect of the gold discoveries upon prices. The monometallists contest this theory and deny that it rests on a sufficient basis of historical fact. They hold that there are no inherent reasons why the combined production of gold and silver should not under a bimetallic system fluctuate quite as much as the production of gold alone.

We have endeavored to state the case between the two parties as one of pure theory. In so doing we fail to give any adequate idea of the heat of the controversy and the passions which it has aroused. To understand properly the ardor of the struggle, a brief reference to the historical setting of the discussion is perhaps desirable. The great bulk of the theoretical and controversial literature upon the subject appeared in the period between 1873 and 1898. This was a period of steadily falling prices—a period, upon the whole, of commercial depression. Trade languished, and the burden of debt grew heavier. The gold product was growing less each year, yet the general adoption of the gold standard with increased population, and an extension of the use of a money economy made a constantly increasing pressure upon the gold supply. Bimetallism seemed to promise a relief from the deadening effects of falling prices, and the industrial world lent a ready ear to its plans. It was not so much a conviction that bimetallism was right as a deep-seated feeling that the gold standard was wrong which gave such wide acceptance to its propositions. For the moment the pressure of immediate necessity has been removed. The new output of gold in the world, which brings the annual production higher than in the palmiest days of California and Australia, has induced a régime of rising prices which has cured the evils of which men complained without any radical monetary legislation such as bimetallism contemplated.

The literature of bimetallism is extensive, and no statement of references can be complete. An exhaustive bibliography on the money question was issued in 1878 as an appendix to the *American Report of the International Monetary Conference.* (Consult Horton, *The Monetary Situation,* Cincinnati, 1878.) Since that time the output has been enormous. The bimetallic theory claims the authority of Wolowski and Cernuschi in France; Malou and de Laveleye in Belgium; Mees, Vrolik, Van den Berg, and Boissevain in Holland; Seyd, Nicholson, and Foxwell in England; Arendt in Germany; Haupt in Austria; Horton, F. A. Walker, and Andrews in the United States. On the side of the single standard are many of the older English economists—Locke, Petty, Harris; later Lord Liverpool, Tooke, Ricardo, and J. S. Mill, and, more recently, Giffen—and among American writers, Wells and Laughlin. For a clear notion of the controversy, consult: Walker, *International Bimetallism* (New York, 1896); and Giffen, *Case Against Bimetallism* (London, 1896). Other works to be commended are: Nicholson, *Money and Monetary Problems* (London, 1897); Horton, *The Silver Pound* (London, 1887); Walker, *Money* (New York, 1878) and *Money, Trade and Industry* (New York, 1879); Andrews, *An Honest Dollar* (Hartford, 1894); *Report of the Monetary Commission of the Indianapolis Convention* (Chicago, 1898); Helm, *The Joint Standard* (London, 1894); Taussig, *The Silver Situation in the United States* (New York, 1893); White, *Money and Banking* (Boston, 1896); Laughlin, *History of Bimetallism in the United States* (New York, 1897); and Price, *Money and Its Relations to Prices* (London and New York, 1896).

In official literature, the *Report of the United States Monetary Commission* (1876); the *Reports of the Monetary Conferences* (1878, 1881, and 1892); the *Reports of the Royal Commission on the Depression of Trade* (1883) and *on the Relation of Gold and Silver* (1886); the *Report of the Indian Currency Commission* (1893); and *of the Berlin Silver Commission* (1894) are important.

BINALONAN, bē'nä-lō'nän. A town of Luzon, Philippines, in the Province of Pangasinán, 27 miles east of Lingayen (Map: Luzon, D 2). It is situated in a densely wooded territory, at the junction of several high roads to the adjacent towns. Population, in 1898, 10,295.

BIÑAN, bē'nyän. A town of Luzon, Philippines, in the Province of Laguna, 41 miles west of Santa Cruz (Map: Luzon, F 9). It is situated in a great plain, near the Bay Luzon, and is connected by high roads with Cavité and Manila, as well as with towns of the vicinity. Population, in 1898, 19,786.

BI'NARY SYSTEM. See DOUBLE STARS.

BIN - BIR - KILISSEH, bēn'bēr - kē'lē - sā' (Turk. *bin*, thousand; *bir*, one; *kilisseh*, church, from Gk. *εκκλησία*, *ekklēsia*). The name of extensive ruins in Karamania, Asia Minor, 20 miles north-northwest of the town of Karaman. The ruins consist chiefly of the remains of early Byzantine churches, of which four or five are in fair preservation and over thirty are in ruins. Bin-Bir-Kilisseh is supposed to be the ancient Derbe, though Hamilton identifies it with Lystra.

BINCHE, bäNsh. A town of Hainaut, Belgium, on the Haine, 10 miles east-southeast of Mons (Map: Belgium, C 4). It is well built and walled, has manufactures of leather, cutlery, pottery, glass, etc., and a considerable trade in lace, paper, marble, and coal. Population, in 1890, 10,100; in 1900, 11,500.

BINDING, bīn'dīng, KARL (1841—). A German criminologist and jurist, born in Frankfort-on-the-Main. He studied at the universities of Göttingen and Heidelberg, and in 1873 became professor of criminal law in Leipzig. Of his works on jurisprudence, *Die Normen und ihre*

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Uebertretung (1872-77), in which he attempted a thorough revision of accepted theories respecting criminal law, is especially important. But one volume (1868) appeared of his *Das Burgundisch-Romanische Königreich.* In 1885 he established the *Systematisches Handbuch der deutschen Rechtswissenschaft.* Among his other publications may be mentioned *Die rechtliche Stellung des Kaisers im heutigen deutschen Reiche* (1898), and *Grundriss des deutschen Strafprozessrechts* (1899).

BINDRABAN, bĭn'drä-bŭn' (Skr. *Vrudāvana*, a grove consecrated to Krishna or Vishnu), or BRINDABAN. A town on the Jumna, in the District of Muttra, Northwest Provinces, British India, situated 92 miles south of Delhi (Map: India, C 3). Population, 31,600. It is one of the sacred Hindu cities, and crowds of pilgrims come from all parts chiefly to do honor to Krishna. It has several superb temples and shrines, and, through the munificence of wealthy devotees, these are becoming more numerous and costly. Here, as at Benares, the immediate margin of the river is occupied by flights of steps, or ghats, extending for about a mile along the bank.

BINDWEED. See CONVOLVULUS.

BINET, bē'nā', ALFRED (1857—). A French psychologist, director of the laboratory of physiological psychology at the Sorbonne, Paris. He was born in Nice, July 8, 1857. He went to Paris in 1871, and, having studied law and medicine, turned his attention in 1880 to experimental and pathological psychology. He has contributed many articles to the *Revue philosophique*, the *Revue scientifique*, and *Mind.* His first book was *La psychologie du raisonnement; Recherches experimentales par l'hypnotisme* (1886), in which he undertook to apply the method of hypnotism to psychological questions. In a similar vein was *Animal Magnetism* (Eng. trans., 1888), which he published in conjunction with Charles Féré. His other works are *Perception intérieure* (1887); *Etudes de psychologie expérimentale* (1888), comprising a section upon sexual psychology (fetichism in love), one upon the psychic life of micro-organisms (translated separately, 1889), and a third upon mental imagery; *Les alterations de la personalité* (1892); *Introduction à la psychologie expérimentale*, in connection with Philippe, Courtier, and V. Henri (1894); *La fatigue intellectuelle*, with the collaboration of Henri (1898). Since 1895 Binet has also, together with H. Beaunis and Th. Ribot, edited *L'Année psychologique*, a yearly volume comprising original articles, a review of the progress of psychology, and an index of all publications which bear upon that science.

BINET, SATANÉ. A pen-name used by Francisque Sarcey.

BING'EN (anciently, *Bingium* or *Vincum*, capital of a Gallic tribe). A town in the Grand Duchy of Hesse, Germany, 17 miles west of Mainz, and nearly opposite Rüdesheim (Map: Germany, B 4). It is situated in a charming country on the left bank of the Rhine, at the mouth of the Nahe, here crossed by a mediæval bridge, built on the foundation of the Roman bridge of Drusus, a name the bridge still bears. Its Gothic parish church, dating from the Fifteenth Century, contains a fine crypt of much older date. Bingen possesses a Realschule, and a number of other educational institutions. In the vicinity of the town is the Rochusberg, with a chapel, to which annual pilgrimages are made. On the other side of the Nahe is the Rupertsberg, with the ruins of a monastery, in which Saint Hildegard resided in the Twelfth Century. Below the town is the celebrated Binger Loch, formerly a dangerous point in the navigation of the Rhine, but since 1834 rendered safe through the deepening of the channel. In the middle of the river stands the Mouse Tower, in which, according to the legend, Archbishop Hatto was devoured by mice in the year 969. Bingen's principal industries include the manufacture of starch and tobacco, and there is a large trade in wine. Population, in 1895, 8187; in 1900, 9670. Bingen was a town of the ancient Belgæ. Drusus built a castle there and threw a bridge across the Rhine, in B.C. 13. In 1281 it came under the rule of the Archbishop of Mainz. During the Thirty Years' War, it was taken in turn by the French, the Swedes, and the Imperialists. In 1689 the French burned the town and blew up the castle. From 1797 to 1814 the town belonged to France. In 1815 it became a part of Hesse.

BINGER, băn'zhā', LOUIS GUSTAVE (1856—). A French African explorer, born at Strassburg. In 1887 he started from Bammako, explored Sikaso, and then turned to Kong, which he was the first European to explore. After disproving the hitherto accepted theory that there were mountains in that region, he visited Baromo and Wagadugu (1888), and in 1889 reached Grand Bassam. By treaties, he succeeded in placing Tieba, Kong, and Bontuku under a French protectorate, and thus laid the foundation of a French Sudanese empire. He returned to West Africa in 1892, as French commissioner for the settlement of the Ashanti boundaries with England, and after serving as governor of the French territory on the Ivory Coast (1896), became director of the French colonial department in 1898. His chief publications are *Du Niger au golfe de Guinée, par le pays de Kong et de Mossi* (1891), and *Esclavage, Islamisme et Christianisme* (1895).

BINGHAM, bĭng'am, JOHN ARENDE (1815-1900). An American jurist and legislator. He was born at Mercer, Pa., and was educated at Franklin College, Ohio. From 1855 to 1863 he served as a representative in Congress from Ohio, and was chairman of the House board of managers in the impeachment trial of West W. Humphreys, United States district judge of Tennessee, who, in an address delivered at Nashville December 29, 1860, had advocated secession, and was consequently accused of high treason. Mr. Bingham subsequently prepared and introduced the Fourteenth Amendment to the Constitution of the United States. He conducted the prosecution of Mrs. Surratt and others charged with complicity in the plot to assassinate President Lincoln and his cabinet, and was chairman of the board of impeachment of Andrew Johnson in 1868. After serving four additional terms in Congress (1864-72), he was, in 1873, appointed United States minister to Japan, which position he held until 1885.

BINGHAM, JOSEPH (1668-1723). An English clergyman. He was educated at Oxford, was a tutor there in 1691, and somewhat later was a

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rector near Winchester. Here he wrote his valuable *Antiquities* of the Christian Church (1708-1722), which has often been reprinted and translated into various languages. He was subsequently rector at Havant.

BINGHAMTON, bĭng'am-ton. A city and the county-seat of Broome County, N. Y., on the New York, Lake Erie and Western, the main line and branches of the Lackawanna, and the Delaware and Hudson railroads (Map: New York, E 3). It occupies an area of 10 square miles at an elevation of about 850 feet, and has a picturesque location. The Susquehanna and Chenango rivers unite within the city, and are crossed by several bridges. Among the more prominent buildings may be mentioned the Stone Opera House, courthouse, city hall, post-office, State Hospital for the Insane, city hospital, State armory, Central High School, and Susquehanna Valley and Saint Mary's homes for orphan children. Other features of interest are Ross Park, of about 100 acres, Bennett Park, the driving park, and exposition grounds. The city contains a law library of the Supreme Court and a city and school library of over 13,000 volumes. Binghamton has extensive manufacturing industries, which include cigars, spices, carriages and carriage-trimmings, wagons, sleighs, leather, boots, shoes, clothing, hats, felt, scales, time-recording clocks, motors, dynamos, electrical apparatus, steam and gas engines, furniture, glass, bottles, hoes, proprietary medicines, wood-alcohol, and envelopes. First settled in 1787, Binghamton was called Chenango Point until, in 1800, its situation was slightly changed and its present name adopted in honor of William Bingham, the proprietor of the land in the vicinity. It was incorporated as a village in 1834, and in 1867 as a city. Its charter provides for a mayor, elected biennially, who appoints the boards of fire, police, street, civil service, and school commissioners, and a city council which controls the appointments of other important officials excepting the city judge, assessors, and board of water commissioners, chosen by popular vote. The annual expenditures of the city amount to about $520,000, the principal items of expense being $30,000 each for the departments of fire and police, and $130,000 for schools. The water-works, built by the city in 1867, are under municipal operation. Population, in 1890, 35,005 in 1900, 39,647. Consult: Wilkinson, *The Annals of Binghamton* (Binghamton, 1840); and Lawyer, *Binghamton, Its Settlement, Growth, and Development* (Binghamton, 1900).

BING'LEY. A town in the West Riding of Yorkshire, England, on the Aire, and the Leeds-Liverpool Canal, 15 miles west-northwest of Leeds (Map: England, E 3). It has considerable worsted, cotton, and paper manufactures. The town owns its water and gas works and maintains a free public library and baths. Population, in 1891, 17,400; in 1902, 18,500.

BINMALEY, bĕn'mȧ-lā'ē. A town of Luzon, Philippines, in the Province of Pangasinan, 3 miles east of Lingayen (Map: Luzon, C 2). It is situated in a level region, on the Gulf of Lingayen. Population, in 1898, 13,787.

BIN'NACLE (earlier *bittacle*, Portug. *bitacola*, corrupted from Lat. *habitaculum*, dwelling-place, from *habitare*, to dwell). A stand for containing and supporting a ship's compass and its correctors. It is made of brass or wood. The binnacle-cover is dome-shaped and fits down over the top of the binnacle, protecting the compass; it contains lamps for lighting up the compass-card at night, and has a glass plate let into the rear side through which the helmsman can see the compass and thus ascertain the direction of the ship's head.

BINNACLE.

BINNENHOF, bĭn'nen-hōf. See HAGUE.

BIN'NEY, AMOS (1803-47). An American physician. He was born in Boston, Mass., October 18, 1803, and died in Rome, February 18, 1847. He was a man of wealth, a patron of artists and scientists, and an early president of the Boston Society of Natural History. He wrote *Terrestrial and Air-Breathing Mollusks of the United States* (Boston, 1847-1851; Gould's edition, 1851-59).—BINNEY, W. G. (born 1833), son of Amos Binney, is a conchologist of note who resides at Burlington, N. J. Besides editing his father's works in a new edition published in the *Bulletin* of the Museum of Comparative Zoölogy (Vol. IV., 1878), the latter has written *Land and Fresh-Water Shells of North America* (Smithsonian Institution, Washington, 1869), and many special papers on this subject. The collection of land and fresh-water shells of North America, and preparations of their anatomy, made by the two Binneys, are in the Museum of Comparative Zoölogy at Harvard University.

BINNEY, HORACE (1780-1875). An American lawyer. He was born in Philadelphia, graduated at Harvard in 1797, studied law in the offices of Jared Ingersoll, was admitted to the bar in 1800, and gradually acquired an extensive practice. Between 1807 and 1814 he published *Binney's Reports*, in six volumes, of the decisions of the Supreme Court of Pennsylvania. Though averse to public life, he served in the Twenty-third Congress and took a distinguished part, as an opponent to the Administration, in the debates over the removal of public deposits from the United States Bank. He then withdrew from active practice in the courts, and until 1850, when he retired altogether from the bar, confined his legal practice to the preparation of written opinions. Perhaps his most famous case was that of Bidal vs. Girard's Executors, which he argued before the United States Supreme Court in 1844. His argument in this case is considered to have greatly modified the old conception of the law of charities. Binney was frequently called upon to speak before public meetings, and he published addresses on the *Life and Character of Chief Justice Tilghman* (1827) and the *Life and Character of Chief Jus-*

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tice Marshall (1835). He also published *A Sketch of the Life and Character of Justice Bushrod Washington* (1858); *Leaders of the Old Bar of Philadelphia* (1858); *An Inquiry Into the Formation of Washington's Farewell Address* (1858); and three pamphlets (1862-63) on *The Privilege of the Writ of Habeas Corpus Under the Constitution*, in which he strongly supported President Lincoln.

BINNEY, THOMAS (1798-1874). An English non-conformist divine, born at Newcastle-on-Tyne. He studied at the theological seminary at Wymondeley, Hertfordshire, and in 1824 became pastor of Saint James's Street Congregational Chapel, Newport, Isle of Wight. From 1829 to 1869 he was pastor of King's Weigh-House Chapel, London, and from 1869 was professor of homiletic and pastoral theology at New College, London. For forty years he was famous as a pulpit orator. He was known also as a keen controversialist, and published numerous pamphlets in discussion with representatives of the Establishment. He exerted an important influence in the enrichment of the musical services of Dissenters, and wrote considerable devotional verse, of which the hymn "Eternal Light! Eternal Light!" is most familiar. His publications include: *Is It Possible to Make the Most of Both Worlds?* (1853); *Micah, the Priest-Maker* (1867); and other works. Consult J. Stoughton, *Memorial of the Late Thomas Binney* (London, 1874).

BINOC'ULAR MI'CROSCOPE. See MICROSCOPE.

BINOCULAR TELESCOPE. A telescope with two tubes and two separate systems of lenses. See OPERA-GLASS and TELESCOPE.

BINO'MIAL (Lat. *bis*, twice + *nomen*, name, thing, item). In algebra, an expression consisting of two terms connected by the sign + or —; e.g. a + b, (a + b) — c. Each term of the binomial may be a polynomial (q.v.).

BINOMIAL COEFFICIENTS. The coefficients of the various terms in the expansion of a binomial, as of (a + b)n. The general form for the *k*th coefficient after the first, which is 1 (when *n* and *k* are integral), is the same as the combination of *n* things taken *k* at a time; i.e. $C_{n,k} = \frac{n(n-1).....(n-k+1)}{1.2.3.....k}$, symbolized as $\binom{n}{k}$

There are certain interesting relations between these coefficients, e.g. $\binom{n}{k} = \binom{n}{n-k}$, $\binom{n}{n} = 1$, $\binom{n}{k} + \binom{n}{k+1} = \binom{n+1}{k+1}$, $1 - \binom{n}{1} + \binom{n}{2} - \binom{n}{3} + ... + (-1)^n \binom{n}{n} = 0$.

BINOMIAL THEOREM. A general formula for raising a binomial, as a + b, to any power, the meaning of the word power being extended to include exponents which are not positive integers. The formula is:

$$(a+b)^n = a^n + na^{n-1}b + \frac{n(n-1)}{1.2}a^{n-2}b^2 + \frac{n(n-1)(n-2)}{1.2.3}a^{n-3}b^3 + ... + \frac{n(n-1).....(n-n+2)}{1.2.....(n-1)}a^{n-n+1}b^{n-1} + b^n$$

where *n* may be any rational, irrational, imaginary, or complex number. In case *n* is not a positive integer the expansion is an infinite series, which, unless convergent, is not equivalent to the given function to be expanded.

The truth of the binomial theorem for positive integral exponents has long been known to mathematicians, but Newton first extended its application and emphasized its general usefulness.

BINON'DO. A suburb of Manila (q.v.), situated on the right bank of the Pasig River.

BINTURONG, bĭn'tū-rŏng (native name). A large arboreal civet (*Arctitis binturong*), allied to the paradoxures, but representing a separate genus of the Viverridæ. It inhabits the Malay Peninsula and islands, and is 2½ feet long in body, with a bushy tail nearly 3 feet in length and prehensile, assisting it in climbing. It passes its day asleep in a tree, and at night hunts in a slow, cautious way for animals, birds' nests, etc., and also seems to eat vegetable substances. The adult is black, but younger specimens are grizzled or yellowish. Its fur is long and harsh, and it has long, bristly brown hairs about the mouth, ears, and eyes, giving it a very strange appearance. Its nature is fierce, but it is frequently kept in captivity.

BINZ, bĭnts, KARL (1832—). A German physician and pharmacologist, born at Bernkastel. He studied at Würzburg, Bonn, and Berlin, and in 1868 became professor at Bonn. In 1869 he founded the pharmacological institute there. His more important investigations have to do with experimental pharmacology and pathology. The action of quinia was first defined by him. His publications include: *Experimentelle Untersuchungen über das Wesen der Chininwirkung* (1868); *Das Chinin nach den neuern pharmakologischen Arbeiten* (1875); *Ueber den Traum* (1878); *Vorlesungen über Pharmakologie* (1891); and *Aether gegen den Schmerz* (1896).

BINZER, bĭnts'ĕr, AUGUST DANIEL VON (1793-1868). A German author. He was born at Kiel and studied law at the universities of Kiel and Jena, where he became closely identified with the *Burschenschaft*, or students' society, which was dissolved in 1819. Afterwards he taught and edited papers in various parts of Germany. He is the author of two famous songs: "Wir hatten gebauet ein stattliches Haus," written on the dissolution of the Burschenschaft, and "Stosset an," which still retain their popularity. Among the works published by him are *Venedig im Jahre 1844* (1845); *Erzählungen und Novellen*, written in collaboration with his wife and published under the pseudonym of A. T. Beer (1856). He also translated Benjamin Franklin's *Autobiography* and *Writings* (1829) and the *Night Thoughts*, by Edward Young.

BIO-BIO, bē'ō-bē'ō. An eastern province of Chile, bounded by Argentina on the east, the Chilean Province of Malleco on the south, and Concepcion on the west and north (Map: Chile, C 11). Area, 4158 square miles. The surface is generally mountainous and well wooded. In the lower parts the soil is mostly sandy. The chief river is Bio-Bio. There is a large trade in timber, and the western part of the province is crossed by the railway line leading from Concepcion to Angol. Population, in 1895, 88,749. The capital, Los Angeles, is situated near the railway line, and had a population in 1895 of 7868.

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BIO-BIO. The largest river of Chile. It rises in the Cordilleras, and after a northwesterly course of about 220 miles, with its lower reaches along the great valley between the Andes and the Coast range, empties into the Pacific Ocean just below Concepcion (Map: Chile, C 11). It has a number of tributaries, has a width of 2 miles at its mouth, and becomes navigable at Nacimiento.

BI'OGEN'ESIS (Gk. βίος, *bios*, life + γένεσις, *genesis*, origin, source). The doctrine that the series of forms which an animal passes through in developing from the egg to the adult is an epitome of the stages in the evolution of the species. This is stated briefly in the expression: Ontogeny recapitulates phylogeny. The truth of this doctrine seems to have been recognized long ago, according to Meckel (1811) by Aristotle, Halley, Harvey, Kielemeyer, Autenreith, and many other early authors. The law is often called Von Baer's, because in his great work on the development of animals (1828-37) he demonstrated its truth in detail. Louis Agassiz also laid stress on this law, although he did not accept evolution. The law is based upon observed parallelisms between ontogenetic changes and assumed evolutionary ones. Thus, at an embryonic stage, man possesses gill-slits and a two-chambered heart, like a fish; later the gill-slits close and the heart becomes reptilian. A tail like that of lower apes is present at a later stage. At birth the child grasps things with its feet, as the higher apes do, and not until several months after birth are the essentially animal instincts replaced by the human. To render the terminology of the stages of ontogeny and phylogeny more precise, and at the same time comparable, the following terms have been introduced by Alpheus Hyatt:

Ontogeny or Development		Phylogeny or Evolution of the Phylum	
Stages	Stages	Stages	Dynamical Terms
Embryonic	Embryo or fetal	Phylembryonic	
Neplonic	Baby	Phyloneplonic	Epacme
Neanic	Adolescent	Phyloneanic	
Ephebic	Adult	Phylophebic	Acme
Gerontic	Senile	Phylogerontic	Paracme

The recapitulation law remains unexplained; it does not hold in detail, but only in a rough and general way. "The embryonic record," says Balfour, "as it is usually presented to us, is both imperfect and misleading. It may be compared to an ancient manuscript with many of the sheets lost, others displaced, and with spurious passages interpolated by a later hand." See EMBRYOLOGY; and GASTRÆA THEORY.

Abiogenesis, though apparently merely the negation of 'biogenesis,' has a somewhat different meaning, the term signifying reproduction by spontaneous generation—not now accepted as a fact in any case.

BI'OGEOL'OGY. See PALEONTOLOGY; PALEOBOTANY; and GEOLOGY.

BIOG'RAPHY (Gk. βίος, *bios*, life + γράφειν, *graphein*, to write). A term applied to that department of literature which treats of the lives of individuals. The mode of treatment, especially in modern times, is far from uniform. In some cases biography approaches the sphere of philosophy; in others, that of history; while in the majority it assumes, to a large extent, the character of analytic or descriptive criticism. To none of these modes, theoretically considered, can there be any valid objection; everything depends on the judiciousness of the biographer. The great points which he must keep perpetually in view are the personality and characteristics of his subject. If these are buried under a load of digressive dissertations, his book, however valuable or interesting, ceases to be a biography except in name. Such a book, for example, is Masson's *Life of Milton*. Anciently, biography was more of a mere *curriculum vitæ* than it is now; that is to say, the leading incidents of a man's life were narrated in their historical sequence, without any elaborate attempt to analyze the character from which they emanated. Like ancient history, it was possessed of a simple greatness, a stately dignity of narrative, colored here and there, but sparingly, with grave eulogy or censure. Modern biography, on the other hand, like modern history, is full of elucidations, criticisms, and disquisitions; and if wanting in the severe grace of its classic predecessors, it is much more lively, acute, and expansive.

Biographical literature has existed from an early period. The oldest historical books of the Jews abound with beautiful examples of it, such as the lives of the Patriarchs and the story of Ruth. Indeed, the mythologies of all ancient nations are but the lives of heroes and gods. Of purely biographical works, the most valuable that has come down to us from the Greeks is the *Parallel Lives* by Plutarch, written about the close of the First Century after Christ. Roman literature also possessed an admirable specimen in the *Life of Agricola* by his son-in-law, Tacitus. Besides these may be mentioned the *Lives of the Twelve Cæsars* (in Latin), by Suetonius, and *Apollonius of Tyana* (in Greek), by Philostratus, *Lives of the Sophists* (in Greek), by Philostratus, and a *Life of Plato* (in Greek), by Olympiodorus of Alexandria. Coming down to a later period we meet Saint Jerome's *Lives of the Fathers;* while biographies, more or less complete, of saints, martyrs, bishops, etc., are scattered profusely through private ecclesiastical literature. The monks of the Middle Ages employed their leisure in weaving legends that abound in superstition and absurdities. Modern biographical literature really dates from the Sixteenth and Seventeenth centuries. Among the valuable works that then appeared may be mentioned Vasari's *Lives of the Painters* (Florence, 1550); the *Acta Sanctorum* (q.v.); Tillemont's *Mémoires pour servir à l'histoire ecclésiastique des six premières siècles de l'église*, 10 vols. (Paris, 1693); Thomas Stanley's *History of Philosophy*, containing the lives, opinions, actions, and discourses of philosophers of every sect (first edition, London, 1655-62; 4th edition, with *Life*, London, 1743); Bayle's *Dictionnaire historique et critique* (Rotterdam, 1697).

In England and elsewhere, the biography of the man of letters is a late development. The men who visited the Globe Theatre never thought of writing the life of Shakespeare. To them the career of the dramatist seemed uneventful, for it was in no wise connected with the great affairs of Church and State. The signs of a new era appeared with the publication of Walton's charming *Lives* (1670), comprising Donne, Wotton, Hooker, and Herbert. This list, however, contains the name of no one who devoted himself wholly to letters. Walton's volume was followed by Wood's *Athenæ Oxonienses*

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(1690-92), the lives of Oxford writers and bishops, and by Aubrey's *Minutes of Lives* (not published till 1813), containing sketches of Bacon, Milton, Hobbes, and others. These two writers, who depended largely upon anecdotes, were the forerunners of Boswell, whose *Life of Dr. Johnson* (1791) is the most famous of English biographies. Since the appearance of this work, biographical literature has increased enormously. There is no escape now for the man of letters. Among noteworthy biographies, since Boswell, are Lockhart's *Scott* (1836-38); Forster's *Dickens* (1872-74); Trevelyan's *Macaulay* (1876); Cross's *George Eliot* (1884); *Tennyson*, by his son (1897); and *Life and Letters of Huxley*, by his son (1901). Cross adopted the novel plan of letting George Eliot speak through her letters, chronologically arranged, and elucidated by brief remarks. This method, which does away with the fulsome praises of the biographer, is very attractive, and has, perhaps, led to a taste for the correspondence of literary men. Among notable volumes of letters of recent date are Matthew Arnold's (1895) and Stevenson's (1900). Beginning with Dr. Johnson's *Lives of the Poets* (1779-81), there is a long line of works in which biography is combined with criticism. To this class belong Macaulay's *Lives of Milton, Addison*, etc.; Carlyle's *Lives of Burns, Sterling*, etc.; Grimm's *Michael Angelo*, and many series of which the type is represented by the *English Men of Letters*, the *American Men of Letters*, and *Les grands ecrivains français*. Biographical dictionaries date from the *Elucidarius Carminum et Historiarum* (Holland, 1498). But the Nineteenth Century was their flourishing period.

Among the best general dictionaries are the *Biographie universelle, ancienne et moderne*, new ed., 45 vols. (Paris, 1843-65); and the *Nouvelle biographie générale*, 46 vols. (Paris, 1852-77). The best work of the kind published in the United States is *Lippincott's Pronouncing Biographical Dictionary*, by Dr. Joseph Thomas. Most nations have biographical dictionaries confined to their own celebrities. For Germany, there is the *Allgemeine deutsche Biographie*, Bavarian Academy of Sciences (Leipzig, 1875-1900); for Austria, the *Biographisches Lexikon des Kaiserthums Oesterreich*, ed. by Wurzbach (Vienna, 1856-89); for Holland, the *Biographisch Woordenboek der Nederlanden*, ed. van der Aa (Haarlem, 1852-78); for Belgium, the *Biographie nationale de Belgique* (Brussels, 1866-95); for Sweden, *Biographical Handbook*, ed. Hofberg (Stockholm, 1876); for Russia and Spain, there are also good biographical dictionaries. England has the magnificent *Dictionary of National Biography*, 63 vols., ed. Stephen (London, 1885-1900), to which were added three supplementary volumes in 1901; and the United States, Appleton's *Cyclopædia of American Biography*, 6 vols. (New York, 1887-89), a seventh volume appearing in 1900 as a supplement, and Lamb's *Biographical Dictionary of the United States*. For contemporary biography, we have Vapereau's *Dictionnaire Universel des Contemporains*, *Men and Women of the Time*, *Who's Who* (London); and *Who's Who in America* (Chicago), revised annually. They contain only the names of persons still living.

Belonging to this department of literature is the autobiography, i.e. the life of a person written by himself. We may cite, for their charm, the *Autobiography* of the first Lord Herbert of Cherbury; Benvenuto Cellini's *Vita da lui medesimo scritta;* Rousseau's *Confessions;* Goethe's *Dichtung und Wahrheit;* Gibbon's *Memoirs;* Franklin's *Autobiography;* Scott's *Journal;* Newman's *Apologia;* and Ruskin's *Præterita*. This form of biography often runs into fiction, as in Borrow's *Lavengro*. The interesting development of biography, of which outlines are here presented, has never been adequately treated. See ENCYCLOPÆDIA.

BIOL'OGY (Fr. *biologie*, from Gk. *βίος*, *bios*, life + *λόγος*, *logos*, discourse). Biology is the youngest, and the most comprehensive, and the most difficult of all the sciences, and it is not strange that its spokesmen are not yet in accord as to its relation to the system of human knowledge as a whole; nor can he who reflects that human knowledge is itself a biological fact, and a constituent part of the subject-matter of biological science, be surprised that this is the case.

Opinions as to the objects and aims of biological science may be roughly divided into two classes. On the one hand, we are told that biology is resolved, in the long run, into the physics and chemistry of living matter; while we are told, on the other hand, that the problems of life, among which those of mind must be included, are so foreign to the present scope and resources of chemistry and physics that they are best treated as constituting an independent realm of science, and a distinct intellectual discipline.

CONTRASTED VIEWS AS TO THE MEANING OF BIOLOGY. Future discovery may show to us a solid basis for the opinion that all the facts of biology, including those of consciousness and reason and volition and moral obligation, are, in ultimate analysis, movements of matter in accordance with the mechanical principles which hold good throughout the inorganic universe; and every thoughtful biologist will keep this consummation in mind as eminently worthy of his best and most earnest and persistent labors. But the opinion that it has already been attained, or must in time be attained, is, at the present day, a creed, or article of faith, rather than a demonstrated fact; for no one has, as yet, manufactured a living being in a laboratory, nor can the writing of a poem, or the discovery of a law of nature, or the performance of a deed of heroic self-sacrifice, be formulated, as yet, in terms of matter and motion. Faith is not science; nor is anything more antagonistic to the inspiration of scientific discovery than the desire to discount its future progress by the declaration that what we hope some day to prove is now to be accepted as truth. On the other hand, no one who reflects upon the past progress of science should, knowingly, stand committed to any opinion that would not still be tenable, even if all the manifestations of life, including those of intellect and volition and duty, should some day be reduced to mechanics, and should prove to be new illustrations of the law and order which pervade the universe, as strictly defined as the movements of the planets in their orbits, rather than exceptions to law, and interruptions to the order of nature.

He who, in the fear that duty may prove to be no duty, right and wrong neither right nor wrong, and freedom and moral responsibility

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mere illusions—he who, in fear of these evil consequences, dreads the reduction of human conduct to mechanics, may seek refuge in some corner of the realm of biology in hope that, since it has not yet been invaded by the inquisitive man of science, perhaps it never may be; but nothing could be less judicious, in view of the present condition and prospects of biology, than thus to take refuge under the shelter of ignorance. He who believes that evil consequences will follow the prevalence in biology of mechanical conceptions, is not the only advocate of opinions that the progress of biological science may, in time, render untenable. It happens, oddly enough, that certain highly esteemed thinkers, who are among the most enthusiastic advocates of a mechanical interpretation of all the facts of biology, and who claim to speak with authority upon the philosophical meaning of physical science, are also the advocates and defendants of a system of philosophy that no one could, in consistency, accept, or even consider with favor, if all the facts of biology were to be formulated in terms of matter and motion; because this system of philosophy commits its disciples to the belief that there is a 'chasm' which is 'intellectually impassable' between the facts of physics and the facts of consciousness. Herbert Spencer, for example, is inevitably led, by the premises of his system of philosophy, to believe and to teach that mind "is something without any kinship with other things; and from the sciences which discover, by introspection, the laws of this something there *is no passage* by transitional steps to the sciences which discover the laws of these other things." As we are also informed by this philosopher that, while the volume of the synthetic philosophy which is to deal with the evolution of living beings from inorganic matter is not yet written, he has handled the subject of later volumes as if the reader had this missing volume in his mind; the cautious biologist, who wishes to hold no opinion that he could not still maintain even if all the facts of biology were reduced to mechanics, may be somewhat puzzled, in lack of this missing volume, as to the frame of mind in which he is to approach the works of the author of the *Principles of Biology*.

Turning now, for the present, from the opinion that biology is the physics and chemistry of living matter, let us consider the opinion that its objects and aims and methods are so foreign to the physics and chemistry of our day that we must regard it is an independent realm of science; for there is much to be said in support of the opinion that, even if all biological facts were to be reduced to mechanics and formulated in terms of matter and motion, biology would still remain an independent science, as distinct from physics and chemistry as, for example, the shoeing of a horse is from the painting of a picture. While both these handicrafts consist in the movement of matter according to the laws of mechanics, this fact, assuredly, affords no satisfactory account of either of them; nor would the reduction to mechanics of the desires and motives and voluntary acts and rational and emotional processes which find expression in the horseshoe and the picture show that, because blacksmithing and art are both to be reduced to physics and chemistry, they are fundamentally identical. Even if the day were to come when all this had been accomplished, physics would still remain physics, and blacksmithing and art would still be what they are.

If, like Paley, I kick a stone, I may change its position, raise its temperature, and bring about other changes which might have been predicted from a few simple data. What happens if, instead of a stone, it is a dog that I kick? In addition to certain changes that are obviously mechanical, like those in the stone, I start a new set of changes that could never be predicted from the study of the kick alone. But note this remarkable fact: Show me the dog, and I may be able to tell you what he will do. If he have short hair, a pink skin, a big occipital crest, great cheek-muscles, a long mandibular bone, a short nose with little pigment, small red eyes, and short, crooked legs, he will not act like a curly-haired dog with long silky ears, large dark eyes, a long, black, pointed nose, a bushy tail, and long legs with large feet.

What has the color of the dog's nose or the size of his feet to do with the effect of the kick? Obviously, nothing at all; but the changes in the dog which follow the kick are not its mechanical equivalent, for they might follow an unsuccessful attempt to kick just as they follow an actual blow. The color of his eyes, etc., are racial characteristics which show what his ancestry has been; how his parents and other ancestors have behaved under similar assaults. With this scientific knowledge of dogs we may conjecture, with some confidence, how this one will behave; but in order to compute his conduct with anything like accuracy, we must have still more information. If his master habitually beats and bullies him, he will not act like a dog brought up with more discretion. If he is young, and has not learned independence, and self-reliance, and distrust of strangers, he will not act like an older and wiser dog; and if eyes and limbs and teeth are failing, his conduct will be still different. If the kick awakes him from sleep, he will not act like a dog disturbed while eating; nor will a lost dog, oppressed by a sense of friendlessness, act like one whose master is near; nor one assaulted at home, like one on forbidden ground; nor one attacked while in the discharge of duty, like one detected in theft or in forbidden pleasure. The attitude of the assailant, or even such little things as the size of the pupil of his eye, or the contraction of one or another facial muscle, may tell the dog what emotions accompany the kick; and if I myself be accompanied by a dog, this third party may modify the result without any share in the assault.

What a difference between a kick against a dog and one against a stone! In one case the conditions may be stated in few words, and the result may be computed; while in the other, a book would not suffice for the statement of all the facts, and the best science of our day is powerless to formulate the result in terms of mechanics.

It may be that all the conditions which modify the result are embodied in the structure of the dog, for we have no reason to seek them anywhere else. I see no reason to doubt that, if the dog's body could be preserved without change, it might, some day in the remote future, be studied by some naturalist who would be able to tell what conduct would have followed the kick with all the certainty with which one may foresee the effect of an opened valve in a steam-engine;

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but we have not yet noted the most essential characteristics of the dog's actions. They are significant. They have a meaning. They stand in judicious adjustment to the canine world. Whether he shuts his eyes, throws back his ears, and, straightening his tail, plants his teeth in my leg, or crouches at my feet with his muscles relaxed, his ears pendant, and his tail trailing, or, putting his tail between his legs, runs away howling, the reason for his conduct is not the mechanical impact of the blow, nor the pain which it causes, but the importance of escape from the further injury which may follow. The means he adopts are those which have been favorable to this result in the past history of dogs.

It is clear that the meaning of the dog's actions can never be learned by studying his body; for if the meaning which we apprehend is embodied in any structure it must be in our own rather than that of the dog. The dog no doubt knows, just as we do, that in the natural course of events the attack is a sign of a disposition to do him further harm, and that he may arrest or avert this by doing something on his own part to meet it and prepare for it; but we know, in the case of most organisms, only the response and not the consciousness of it. The important point, however, is this: The kick is a sign of something that may follow, and the responsive actions are not the mechanical equivalent of the kick; for they are directed or adjusted, either with or without consciousness and reason, to an event of which it is only the forerunner or sign. The changes in the stone are the effect of the blow, while the changes in the dog are, in some way, the result of the past history of the dog and of his ancestors; for, all through this history, violent assaults have been associated with danger of further violence. This difference is as wide as the difference between life and its absence; and the independence of biology as a science is due to its existence. It is what Herbert Spencer means by the dictum that life consists in the continuous adjustment between internal relations and external relations; and it is what Aristotle means by teaching that the essence of a living being is not what it is made of nor what it does, but why it does it.

A living being is a being that responds to the changes which go on in the world around it, for life consists in the maintenance of adjustment between the changes that go on in the external order of nature and those that take place in the living body. Life is response to the established order of external nature; for the responsive actions of living beings are such that our own reason approves them as judicious and reasonable and likely to prove beneficial. This truth has often found expression in the statement that living things use the properties of the world around them for their own good, or that of their species. The same thought may be expressed by the statement that life is the use of the natural language of signs, for each stimulus to a vital act is, in course of nature, a sign with a significance; and the act is itself a response to the significance of which, in course of nature, the stimulus is the sign.

Physical analysis resolves living beings into organs and tissues and cells and physiological units and organic compounds and molecules and atoms; and it may some day enable us to construct a living organism by the combination of the proper elements. Physiology resolves vital activity into 'functions,' and it may some day express these functions in terms of motion; as may also the psychology which investigates the elementary constituents of mental 'faculty.' A living being is, no doubt, an organic compound, but, to the biologist, it is also something more. It is a coördinated whole; a member of a species; a part of the sum of life; and a constituent of the universe, which would cease to be what it is if nature were different. The biologist finds in it no self-sustaining power and no reality that would endure if it were abstracted from the natural world of which it is a part. Surely, this is good sense and good science. No physiologist who studies the waste and repair of living bodies, no naturalist who knows living beings in their homes, no embryologist who studies the influence of external conditions upon development, can for an instant admit that living beings are self-sufficient or self-sustaining, or that their being is in themselves. For the line we draw, for better study, between living beings and the external world, is not one that we find in nature, but one that we make for ourselves by abstraction and generalization.

The external world of a living thing is as much a part of it as its histological structure. If the environment of its body or of any cell or molecule within its body were different, neither cell nor body would be what it is; and if they had no environment they would not be at all, for neither cells nor eggs nor seeds nor desiccated rotifers exist abstractedly. A self-sufficient and self-contained living being is as fabulous as a griffin or a centaur, but no naturalist thinks for an instant that this truth casts any doubt upon the real existence of living beings. It is not the real existence, but the abstract existence of living things, that the cautious biologist must dispute.

May not the truth that biology is the physics and chemistry of living beings be true only when it is joined with the converse truth that physics and chemistry are part of biology? It is only as living beings that we care to know. If the modest biologist were to assert that the biological aspects of the physical sciences are the only basis for rational interest in these sciences, his good friends in physical and chemical laboratories would no doubt charge him with arrogance, although they must admit that the principles of science, as distinguished from the concrete sciences, are part of biology.

We cannot investigate response to the order of nature without asking what the order of nature is. What are the properties of things and of thought that convince us of its existence? What is this conviction worth? What are the methods by which knowledge of this order is acquired and perfected and extended? How far are these methods and instruments trustworthy? Are any limits to their application known, and, if so, how known? To all these questions the biologist has a peculiar right to ask answers, in addition to the right which he shares with other students of science. The inquiry into the origin of those useful properties in the employment of which life consists is the most fascinating and instructive intellectual occupation within the whole range of human inquiry, for to it knowledge itself owes its significance.

SIGNIFICANCE OF 'FITNESS' THE FOUNDATION OF BIOLOGY. The distinctive problem of biology, the

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problem of fitness or adaptation, the problem to which biology owes its independence among the sciences, has been a familiar one for ages, but it was only through the demonstration, by Wallace and Darwin, that the adjustive machinery of living organisms has come about gradually, through extermination and survival, in accordance with the mechanical principle of natural selection, that the possibility of a mechanical explanation of fitness was made clear.

The discovery and demonstration of the significance of the survival of the fittest seems, to the writer, to be the foundation of scientific biology, and the greatest intellectual triumph of the human mind. It has taught us that response, or the use of one event as a means of preparing for or predicting others — that distinctive attribute of living beings which, in its higher manifestations, we know as human knowledge or science—admits of treatment by methods which do not differ in any essential or fundamental way from those that are employed in geology and astronomy and physics. It is only when we review, in the light of natural selection, the long history of Plato's question: What is science? What is it to know a thing? that we begin to comprehend the transcendent genius of Charles Darwin, and to grasp the significance of his contribution to human knowledge, and to attain to the beginnings of an adequate conception of its supreme intellectual value.

This high estimation of the value of Darwin's contribution to science does not meet the unqualified approval of all biologists; many believing that natural selection is only a minor factor in the evolution of living beings, or, at least, that we must search elsewhere for the origin of the raw material which it picks out and preserves.

We are told that since it is a merely negative process of sifting or weeding out, which does not produce, but only preserves, the fitness which exists, it does not show why there should be any fit to survive, but only how the unfit are exterminated. Without knowing why one horse is more fleet than another, or even why horses exist, breeders have increased the speed of horses by breeding from the most fleet; just as a pack of wolves may increase it in nature, by destroying, generation after generation, all the horses they can run down. If, at every stage in the ancestry of horses, there has been need for greater speed, natural selection accounts for the whole history of this characteristic of horses, and even for the first vague beginnings of locomotion in sedentary or floating animals, which may have found shelter from their enemies, or more abundant food, by those slight changes of place which may at first have been the incidental result of changes of shape.

While it is obvious that a useful quality must exist before it can be useful, and before it can survive, and while no Darwinian holds natural selection to be an ultimate explanation of anything, in the metaphysical sense of the word ultimate, all admit that horses do differ among themselves in speed, and that each may reasonably be expected to be more like its parents in speed than a horse selected at random. As no one disputes the existence of these prerequisites to improvement by selection, the declaration that nothing could come about through selection is childish.

A living being is a being that responds to the stimulus of one event in such a way as to adjust its actions to other events of which, in course of nature, the stimulus is the sign; and if all that have not thus responded have been exterminated in the struggle for existence, the adjustments of the survivors is nothing more than might have been expected. No natural law is an agent. So far as human knowledge reaches, the laws of nature are nothing more than summaries of observed facts, joined to that confidence in the continuity of nature which leads us to expect that what has come about will continue to come about under like conditions. The rational basis for confidence in the continuity of nature seems, to the writer, to be found in the truth that we have survived and are in existence. Our confidence in the validity of science, and in the real existence of order in nature, is equal to, and identical with, our confidence in our own existence. Natural selection seems to the writer to be a strictly scientific explanation of the fitness of living things, and they who assert that it is inadequate because it fails to show why beneficial response should ever follow a stimulus, and thus furnish fitness to be selected, must remember that all science is inadequate in exactly the same degree. In no case does science tell us why natural phenomena do occur in order, although it does tell us what order of events we may reasonably expect. They who challenge the sufficiency of natural selection because it does not tell us why there should be any fitness to select, must find all science equally inadequate, although the common verdict of mankind is that scientific knowledge is very adequate and sufficient for all the needs of living things in that natural universe in which we find ourselves, and of which we are constituent parts, even if it does fail to show us in nature any efficient cause for anything.

The cuckoo that lays her eggs in strange nests gets the hard and exhausting and dangerous work of incubating done for her, whether it is unconsciously, or carelessly, or with forethought that she does so. The advantage is the same, no matter who or what it is that puts the eggs into the strange nest. After the foster-brothers of the nestling cuckoo are destroyed, it profits by the exclusive attention of its two nurses, and so long as the conduct of cuckoos conduces to the welfare of the race, cuckoos will increase and multiply to continue in the same course. We find worldly wisdom in the habits of cuckoos, and the immorality of their conduct is shocking to our refined sense of right; but, so long as the eggs are laid in suitable nests and are hatched, the result may be expected to come about, even if the birds have no more share in the worldly wisdom than they have in the immorality.

The biologist is sometimes told that since he does not know the individual history of any organism in the past, and is even less able to foresee that of any that may exist in the future, he only infers the fitness of living things for their environment from their survival, and cannot logically hold the descendants accounted for by the fitness of their ancestors; but it is our confidence in the continuity of nature, and not ability to say what it was that led to the survival of any individual organism in the past, which convinces us that the fittest have survived in the past, and that they will survive in the

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future, as they do now. While it is true that natural selection does not make anything, it does take away all significance from the reasons some thinkers once thought they had for believing that a living being is anything else than a natural body with a natural history. No two objects, living or dead, ever are exactly alike; and if we admit the endless diversity of nature, and the struggle for existence, natural selection is a fact. While we find it hard to discover any difference between individual house-flies, or ants, or bees, they no doubt differ among themselves in many ways; some excelling in the duration and rapidity of their flight, while others fall below the average in size of wings, or strength of muscles, or in general coördination for flight. The insects that inhabit wind-swept islands are in constant danger of destruction at sea, and those that fly most are most in danger, while those that, for any reason, fly little or not at all are safest, and live longest, and have most descendants. Kerguelen Island is said to be one of the stormiest places on the globe. There are no trees or bushes to afford shelter on the island, which is swept by almost perpetual gales. It is inhabited by several flies, by numerous beetles, and by a moth, but all are incapable of flight, and most are entirely without wings. It is often said that they have lost their wings in order to escape danger, but this is only a figure of speech. We need not know who or what has made them deficient in order to understand the facts. All that did fly have been exterminated, and there would not be any survivors if some had not been deficient in ability or in inclination to fly.

THE THEORY OF EXPERIENCE. Most of the modern critics of natural selection contend that the raw material of which it is said to stand in need is supplied by that influence of the conditions of life which we are accustomed to sum up under the general word 'experience.' They attribute to individual or to ancestral experience the origin of the adaptive actions which natural selection picks out and preserves. Our own times, like the two preceding centuries, are notable for the prevalence of 'experience philosophy'; yet there has been little reflective or philosophical study of experience in the light of modern biology, although it is clear that the biologist who asserts that experience furnishes the raw material which natural selection picks out and preserves must be prepared to give an account of experience which does not attribute it to natural selection.

Recent experiments show that when an animal is placed in such circumstances that it can, by some simple action which is well within the command of its organization, obtain some object that it likes, the way in which it acquires facility in accomplishing the desired action is very noteworthy, and strikingly the same in all the animals that have been studied. A monkey, for example, before which is placed a box that contains, in full view but out of reach, some attractive article of food, which can be obtained only by some simple but definite action, such as pulling a string, or lifting a latch, or pulling out a peg, shows no capacity for learning to perform this action through seeing it done, or by being shown how to do it. If, however, any one among the indefinite and uncoördinated and aimless movements which it makes in trying to reach the object happens to be the proper one and to succeed, and if the time which has been consumed in irrelevant movements be noted, it is found that the adaptive movement comes a little sooner at the second trial, and that, as the experiment is repeated day after day, the interval between the beginning of effort and success grows shorter and shorter, until at last, in course of time, the monkey 'acquires' the art of lifting the latch or of pulling the string without any preceding misdirected movements. He has 'learned by experience' to perform the responsive action under the stimulus of its sensible perception, and thus to gain the desired end; but his experience has come about through the gradual extinction of the aimless and misdirected movements, and the survival of those that are definite and exact. Experiments with fishes and turtles and other animals give the same result. They learn by experience, but their experience consists in the survival of the fittest activities and the inhibition of those that are unsuccessful.

The eyes of the human infant move independently and aimlessly, and it is only after it has spent weeks in experimenting that it suppresses the vague and indefinite movements, and thus gradually and slowly acquires the useful art of coördinating compensating muscles in such a way as to move both eyes together so as to see objects single and solid, instead of flat and tremulous.

Herbert Spencer has pointed out the way in which opinion as to the limits and scope of the powers of governments over the governed has undergone slow modification with the progress of civilization, until most of the extraneous and irrelevant notions of earlier and more primitive peoples have been stripped off, leaving only that which is essential to survive and come down to modern times.

"All science," says Huxley, "starts with hypotheses—in other words, with assumptions that are unproved, while they may be, and often are, erroneous; but which are better than nothing to the seeker after order in the maze of phenomena. And the historical progress of every science depends upon the criticism of hypotheses —on the gradual stripping off, that is, of their untrue or superficial parts—until there remains only that exact verbal expression of as much as we know of the fact, and no more, which constitutes a perfect scientific theory."

It surely requires only a comprehensive view of these examples of 'experience,' drawn from the most widely separated types of vital activity, to see that they all consist in the extinction of the aberrant and the misdirected and the uncoordinated, until only that which is exact and definite survives. There is, therefore, much to urge in defense of Berkeley's contention that "the work of experience is to unravel our prejudices and mistakes, untwisting the closest connections, distinguishing things that are different, instead of confused and perplexed, giving us distinct views, gradually correcting our judgment and reducing it to a philosophical exactness." But the correction of vital activities, and their reduction to exactness by the extinction of those that are confused and perplexed, and the survival of those that are definite and distinct, is what we mean by natural selection.

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If Berkeley is right, if our own experience is but conscious recognition of the universal prevalence and unceasing continuity of the selective process, what becomes of the notion that experience is an activity precedent to selection, and the source of the fitness which it picks out and preserves? In a word, what becomes of the 'philosophy of experience' which meets with so much approval from many modern men of science?

DEPENDENCE ON CONDITIONS. The discovery of natural selection has destroyed all ground for the belief that we, or any living beings, ever do anything that exhaustive knowledge of their material structure and its history may not some day lead us to expect. This is often held to be proof that all things in nature are fixed and inevitable and predetermined, and that our own belief that we control or direct our own conduct, or anything else, is a mere illusion. If we have no reason to believe that we ever do anything that exhaustive knowledge of our bodily frame and its history would not have led us to expect, we are told that our ancestry is our fate. Everything that we feel or think or do is contingent upon our structure; and if this were indeed inevitable and predetermined, we might with good reason declare that we are in the hands of fate, and can never hope to make or mar, to help or hinder. But what reason is there for thinking that proof that a thing is no more than we might have expected would show that it is fixed or fated? The writer is not so vain as to think that his opinion upon this difficult subject will have any weight. He knows well that he will be told that he has failed to grasp the real difficulty, or to understand what it is that has so long perplexed the thoughtful; for he fails to find any antagonism between mechanical interpretations of biological facts and freedom and responsibility. He cannot see, for example, how proof that he does nothing which might not have been expected from him can show that he has no true liberty. Should not he who tries to be a reasonable creature, and to do all that can be expected from him in reason, be utterly unable to see how his success can show that he has failed? How can proof that living beings never do anything that exhaustive knowledge of their structure would not give us good reason to expect show that their actions are predestined or inevitable? Proof that we are part and parcel of the cosmic process cannot tell us who or what has made us so, or that we are helpless, for there is no power, causality, or agency in a process. Processes—evolutionary or otherwise—are matters of fact. There is nothing of agency included in them. If there is agency anywhere, it is not in the selective process, nor in the evolutionary process, nor in the cosmic process, but behind them, and, logically, at least, antecedent to them and independent of them. Is it not clear that if we never discover any agency in processes, neither can we find in them any necessity or any antagonism between them and liberty?

While the progress of biology leaves no logical standing-place for him who believes a living being ever does anything that exhaustive knowledge of its machinery would not lead us to expect under given conditions, it also tells us we should not have reason to expect anything to be as it is if these conditions had not been as they were. It is by finding out, through scientific discovery, what these conditions are that we learn how to direct and modify the course of nature.

They who fear that the extension of mechanical conceptions of biology may some time destroy their conviction that they are reasonable and rational beings, able to act wisely and foolishly, and to do right and wrong, should ask themselves, in all seriousness, whether anything could afford clearer proof that there is no discoverable limit to our ability to influence and modify the cosmic process than the artificial production of a living being would afford. If this were to be accomplished, would it not be tangible proof that they who complain that their inherited organization is their fate, mistake the bonds of ignorance for the bonds of fate? Instead of showing that our knowledge and our conduct are the necessary and inevitable effects of our structure, would it not rather show that we may hope to control and modify our structure through knowledge, when we only know enough about nature? For the blindness of ignorance science gives us a remedy; for the blindness of fate there could be none.

See ANIMAL; BROOKS, W. K.; CLASSIFICATION; DARWIN; EMBRYOLOGY; EVOLUTION; HEREDITY; DISTRIBUTION OF ANIMALS; LAMARCK; NATURAL SELECTION, and other titles in the domains of botany, paleontology, and zoölogy, under which will be found references to the literature of the various phases of biology. Consult, also, Brooks, *Foundations of Zoölogy* (New York, 1900).

BIOLOGY. This term has often been used of plants, especially in Germany, instead of ecology (q.v.), though biology in this sense usually includes the more sensational topics of ecology, such as pollination, carnivorousness, etc., rather than the broad field which is now known as ecology. The term in this sense should be discarded. See ECOLOGY.

BI'ON (Gk. Βίων) OF SMYRNA. A Greek bucolic poet of the Third Century B.C., a younger contemporary and imitator of Theocritus (q.v.). Of his works there are extant seventeen short poems and his longer "Lament for Adonis" (Ἐπιτάφιος Ἀδώνιδος), a hymn of great beauty and tenderness, which shows many reminiscences of Theocritus's first idyl. It became itself the model for Shelley's *Adonais*. The poems are edited with Theocritus and Moschus, by Ahrens (1855); Meineke (1856); Ziegler (1868); the Ἐπιτάφιος with translation and explanatory introduction by Wilamowitz-Muellendorff, *Adonis* (1900). See also Smyth, *Greek Melic Poets* (New York, 1900).

BIONDO, byŏn'dô, FLAVIÓ. See FLAVIÓ BIONDO.

BI'ONOM'ICS (Gk. βίος, *bios*, life + νόμος, *nomos*, law), or ECOLOGY. The science which deals with the relations of animals or plants to their surroundings; also called ecology, a term especially used by botanists. The science is a new one and has as yet too few adherents. Charles Darwin, Fritz Müller, and Karl Semper are the best examples of workers in this field. Some of the topics with which bionomics deal are: The relation of animals to their inorganic environment; the relation of aquatic

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organisms to the chemical nature of the water, to its density, to its volume, to its temperature and currents, to light, and to gravity; the relations of land animals to the humidity and temperature of the air, to the other chemical and physical properties of the medium, to light, to gravity, and to air-currents; the relation of organisms to alternate submergence and desiccation; their relation to shelter and homes; the relation of animals to their organic environment; their relation to food, to mates, to the nutrition and care of young, or to enemies; animal communities; and the interdependence of organic species, as in parasitism and commensalism or symbiosis. Most of these topics are separately treated elsewhere. Consult Waether, *Einleitung in die Geologie*, Parts I.-II.; *Bionomie der Meeresthieren* and *Lebensweise der Meeresthieren*. See ECOLOGY.

BION'OMY. See PALEONTOLOGY; ECOLOGY; DISTRIBUTION OF ANIMALS; and OF PLANTS.

BIOT, bē'ō' *or* byō, EDOUARD CONSTANTIN (1803-50). A French writer on China. He was born in Paris, July 2, 1803, and was a son of the astronomer J. B. Biot. After a short service in railway enterprises, he devoted himself to the study of Chinese and contributed many valuable papers to the *Journal Asiatique*. He prepared a *Dictionnaire des villes et arrondissements de l'empire chinois* (1842); and he wrote *De l'abolition de l'esclavage ancien en occident* (1840), for which he received a gold medal from the Institute. He became a member of the Academy in 1847, and died March 12, 1850, his love of work having shortened his days.

BIOT, JEAN BAPTISTE (1774-1862). A distinguished French physicist and astronomer. He was born in Paris and early entered the artillery, but forsook the army for science. He was appointed a professor of mathematics at the Ecole Centrale of the Department of the Oise and in 1800 became professor of physics in the Collège de France. He was made a member of the Institute in 1803; and in 1804, at a meeting of that body called to vote in favor of establishing an empire, Biot refused to vote. With Arago he was made a member of the bureau of longitude, and (1806) sent to Spain to supervise the triangulation involved in the measuring of an arc of meridian, preparatory to the introduction of the metric system of weights and measures. He was active in geodetic work, visiting England in 1817 to make observations on an arc of meridian then being measured. Together with Arago he also made an exact determination of the force of gravity in Paris, and they were associated in a number of scientific investigations. Biot was able to demonstrate by direct experiment that the velocity of sound in solids was greater than in air, and was the founder of saccharimetry by the use of the polariscope. He made many discoveries in optics and electricity, and was a constant contributor to the scientific journals. In company with Gay Lussac, he made the first balloon ascent for the purpose of making scientific observations. His most valuable contributions to science deal with the polarization of light; and his researches connected with ancient astronomy are also very valuable. Of his numerous writings may be mentioned *Traité élémentaire d'astronomie physique*, 3 vols. (Paris, 1805); 3d ed., considerably augmented (1850), 6 vols., with vol. of plates—translated into English; *Traité de physique*, 4 vols. (1816); *Précis de physique*, an abridgment of the former in 2 vols. (1818), often republished; *Recueil d'observations géodésiques*, etc. (1821). Biot also contributed many excellent biographies of scientific men to the *Biographie Universelle*. Among the most important of his later works are *Recherches sur plusieus points de l'astronomie egyptienne; Recherches sur l'ancienne astronomie chinoise* (1840); *Mémoire sur la constitution de l'atmosphere terrestre*, in the *Connaissance des temps* (1841); *Mélanges scientifiques et littéraires* (1858); and *Etudes sur l'astronomie indienne et sur l'astronomie chinoise* (1862). See CURVES.

BIPEN'NIS (Lat. *bis*, twice + *penna*, wing, edge). A double-headed axe, a form of weapon found even in stone, known in Homer, and later usually attributed in use to barbarians, and especially to the Amazons.

BI'PONT EDITIONS (*Bipontium* is Latin translation of Ger. *Zweibrücken;* from *bis*, twice + *pons*, bridge). A name given to a classical series of fifty volumes, begun at Zweibrücken (1770) and finished at Strassburg.

BI'QUADRAT'IC EQUATIONS (from Lat. *bis*, twice + *quadratus*, squared). Equations of the 4th degree in one unknown quantity. A function of the 4th degree is often called a quartic. If all positive integral powers lower than the 4th are also present, the equation is called a complete biquadratic. See ALGEBRA; EQUATION.

BIR. See BIREJIK.

BIRAGO, bē-rä'gō, KARL, Baron von (1792-1845). An Austrian military engineer, born at Cascina d'Olmo, near Milan. In 1825 he invented the military bridge named after him, consisting of detachable blocks and pontoons—an invention adopted by the Austrian Army in 1828. He erected the military bridge across the Po, at Brescello (1839), which was followed, a few years later, by a similar bridge across the Danube. His system of constructing military bridges was adopted by nearly all the armies of Europe. He wrote: *Untersuchungen über die europäischen Militarbrückentrains*, etc. (1839); and *Anleitung zur Ausführung der im Felde am meisten vorkommenden Pionierarbeiten.*

BIRCH. Betula, a genus of plants of the natural order *Betulaceæ*. The order contains two important genera, birch and alder, the plants of which are all trees or shrubs, natives of temperate and cold regions.

The genus Betula is distinguished by ten to twelve stamens, and winged achenia. The common birch (*Betula alba*) has small, triangular, doubly serrated leaves. It is a very beautiful forest tree, abounding in the north of Europe and of Asia, often forming large groves by itself. In the south of Europe it is found only upon mountains of considerable elevation. It is a tree of rapid growth. In favorable situations it attains the height of 60 or even 70 feet, with a diameter of 1½ or 2 feet. In the northern, or utmost alpine limits of vegetation, it only appears as a stunted bush. The bark is smooth and silvery white, and its outermost layers are thrown off as the tree advances in age. The smaller branches are very slender and flexible, and in a particularly graceful variety called the weeping

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birch (*Betula pendula* of some botanists) they are still more slender, elongated, and pendulous.

The bark and leaves of the birch are, in some northern countries, used medicinally in cases of fever and eruptions. The bark is also used for yellow dye. It is in some countries made into shoes, hats, drinking-cups, etc. In many parts of the north of Europe it is used instead of slates or shingles by the peasantry; and in Russia—the outer or white layers being subjected to distillation—there is obtained a reddish empyreumatic oil called birch oil; it yields also the birch tar, or *degutt*, which is employed in the preparation of Russia leather. The wood is in universal use in northern countries for a great variety of purposes. It is white, firm, and tough, and is employed by wheelwrights, coopers, turners, etc. It is much employed for smoking hams, herrings, etc., because of the flavor which it imparts. Much of it is made into charcoal for forges. In the highlands of Scotland, and in many other countries, the sap is used, either in a fresh or in a fermented state, as a beverage. The white birch of North America (*Betula populifolia*) very nearly resembles the common birch, but is of much less value. It is found as far south as Pennsylvania. The wood is scarcely used. The black birch, or river birch, of North America (*Betula nigra*), also sometimes called red birch, is very similar to the common birch, and produces very hard and valuable timber. It attains the height of 70 feet. The bark is of a dark color, the epidermis in the younger trees reddish. The name black birch is also given to a species that is found in the more northern parts of North America and is sometimes called the sweet birch, or cherry birch (*Betula lenta*); this also is a tree 70 feet or more in height, of which the timber is fine-grained, and valuable for making furniture and for other purposes. The bark of this species yields an essential oil identical with oil of wintergreen. Its leaves, when bruised, diffuse a sweet odor, and, when carefully dried, make an agreeable tea. The yellow birch of North America (*Betula lutea*) is a tree 70 to 80 feet high, destitute of branches for 30 to 40 feet, and remarkable for its large leaves, which are 3 to 5 inches long, as well as for the brilliant golden yellow color of the epidermis. It is found in Nova Scotia, New Brunswick, Maine, etc. Its timber is used in shipbuilding. The young saplings of all these American species are much employed for making hoops for casks. The paper birch (*Betula papyrifera*) is found in the northern parts of North America. It attains the height of 70 feet. The bark of the young trees is of a brilliant whiteness, and capable of division into very thin sheets, which have been used as a substitute for paper. It is used by the Indians for canoes, boxes, buckets, baskets, etc. The wood is used for the same purposes as that of the common birch. The mountainous districts of India produce several species of Betula. Thin, delicate strips of the bark of the *Betula utilis* are used for lining the tubes of hookahs. They were formerly used as writing-paper. *Betula alnoides*, a native of the mountains of Nepal, is a tree 50 to 60 feet high, covered with branches from the base, and of an oval form. Its wood is strong and durable. The dwarf birch (*Betula nana*) is a mere bushy shrub, seldom more than 2 or 3 feet high, and generally much less. It has orbicular crenate leaves. It is a native of the northern regions of the globe, and is found in some parts of the highlands of Scotland. It is interesting because of its uses to the Laplanders and other inhabitants of very northern regions, to whom it supplies their chief fuel, and the material with which they stuff their beds. Its seeds are the food of the ptarmigan, on which the Laplanders depend in a considerable degree.

Fossil forms of birch are found in the Cretaceous rocks of Greenland and in the Tertiaries of Europe and North America.

BIRCH, Harvey. A fine, resourceful character in *The Spy*, a novel of the American Revolution by Cooper.

BIRCH, Samuel (1813-85). An English antiquarian, Keeper of the Oriental Antiquities in the British Museum. He was born in London, November 3, 1813, the grandson of Samuel Birch, Lord Mayor of London in 1814, and the son of the Rev. Samuel Birch, rector of Saint Mary's, Woolnoth, London. He received his education at the Merchant Tailors' School, and in 1832 entered the service of the Commissioners of Public Records. In 1836, he accepted an appointment as an assistant at the British Museum, and in 1844 became Assistant Keeper of Antiquities in that institution. In 1861 he was advanced to the position of Keeper of Oriental, British, and Mediæval Antiquities. When, in 1866, these departments were divided, Birch was made Keeper of the Oriental Department. He died December 27, 1885.

Birch was a man of varied attainments. During his connection with the British Museum, he devoted much attention to classical and British antiquities, and to numismatics. Among his works on these subjects are his *Catalogue of Greek and Etruscan Vases in the British Museum*, published in 1851 with the collaboration of Mr. Newton, and his *History of Ancient Pottery* (2 vols.), published in 1858. He also wrote a number of papers for the *Numismatic Chronicle* and for *Archæologia*. In early life he was a zealous student of Chinese, and in later years he wrote some translations from that language. Among these, his *Chinese Widow*, published in 1862, is well known. He was also proficient in other Oriental languages, but it is upon his work as an Egyptologist that Birch's reputation chiefly rests. As early as 1838 he published his *Explanation of the Hieroglyphics on the Coffin of Mycerinus*, and some of the most important Egyptological publications of the British Museum were issued under his editorial supervision. Among these are: *Select Papyri in the Hieratic Character* (1841-60); *Inscriptions in the Hieratic and Demotic Character* (1868); *The Rhind Papyri* (1866); and *Facsimile of an Egyptian Hieratic Papyrus* (1876). In 1867 Birch enriched Bunsen's work, *Egypt's Place in Universal History*, by the addition of a valuable volume (Vol. V.) containing the first Egyptian dictionary since that of Champollion, and the first translation of the Book of the Dead; and in 1878 he edited the revised edition of Wilkinson's *Manners and Customs of the Ancient Egyptians*. Birch was a most prolific writer, especially upon Egyptological subjects, and his articles in *Proceedings of the Society of Literature*, *Revue archéologique*, *Zeitschrift für ägyptische Sprache*, and other periodicals, are very numerous. He was one of the founders of *Records of the Past* (1873 ff.),

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and many of his translations of Egyptian texts appeared in this series. He was also one of the founders of the Society of Biblical Archæology, and was a frequent contributor to the *Transactions* and to the *Proceedings* of the Society. For his untiring industry, and his boldness in exploring untried fields of research, Birch's reputation as an Egyptologist stands deservedly high. The best sketch of his life and work is to be found in *Transactions of the Society of Biblical Archæology*, Vol. IX. (London, 1893).

BIRCH, THOMAS (1705-66). An English historian, born at Clerkenwell. He took orders in the Church of England in 1731, was in Essex in 1732, and in 1734 became chaplain to the Earl of Kilmarnock, who was beheaded in 1746. He was then (1746) appointed rector of Saint Margaret Pattens, London, and in 1752 was one of the secretaries of the Royal Society, a history of which he published (4 vols., 1756-57). His first literary undertaking was *The General Dictionary, Historical and Critical* (10 vols., 1734-41), founded on Bayle's celebrated work. He next edited the State papers of Thurloe, secretary to Oliver Cromwell (7 vols., 1742). Among his other works are *Life of the Hon. Robert Boyle*, (1744); *Inquiry into the Share which King Charles I. Had in the Transactions of the Earl of Glamorgan* (1747); *Historical View of the Negotiation Between the Courts of England, France, and Brussels, 1592 to 1617* (1749); *Life of Tillotson* (1752); *Memoirs of the Reign of Queen Elizabeth* (2 vols., 1754), and he edited the works of Sir Walter Raleigh, Bacon, and others.

BIRCH, THOMAS (1779-1851). An American artist. He was born in London, England, but removed to the United States in 1793, and about 1800 began painting portraits in Philadelphia. In 1807 he visited the Cape of Delaware, and thereafter turned his attention to marine painting, in which he showed much skill. During the War of 1812 he painted a series of pictures of naval battles. His paintings of the engagements between the *United States* and the *Macedonian* and between the *Constitution* and *Guerriere* are in the Joseph Harrison collection of Philadelphia. Three of his marine views are in the Claghorn collection.

BIRCH-PFEIFFER, bĕrk'pfīf'ĕr, CHARLOTTE (1800-68). A German actress and playwright, born in Stuttgart. She made her début in Munich at the age of 13, and played with great success in Berlin, Vienna, Hamburg, Saint Petersburg, Pesth, Amsterdam, and other places. In 1825 she married Dr. Christian Birch of Copenhagen. She managed the theatre in Zürich from 1837 to 1843, and then, after visiting professionally most of the cities in Germany, made an engagement with the Royal Theatre in Berlin, which continued until her death. Her plays, although of no high artistic merit, showed true dramatic talent, and a thorough knowledge of stage effects, and met with popular success throughout Germany. Most of her plays were dramatizations of popular novels. The following were especially successful: *Pfefferrösel; Hinko; Die Günstlinge*, probably her best; *Der Glöckner von Notre Dame*, after Victor Hugo; *Die Frau in Weiss*, after W. Collins, and *Die Waise von Lowood*, after Charlotte Brontë's *Jane Eyre*. A complete edition of her writings was published in 1862.

BIRD (origin obscure). Birds are warm-blooded vertebrate animals clothed with feathers, and normally capable of flight. They comprise the class *Aves*. They have existed since early Mesozoic times, exhibit an interesting evolution within very compact and well-defined limits, dwell in every part of the globe, are exceedingly diverse in size, form, ability, and appearance, adapted to every sort of climate and food, show mental qualities of a high order, are of great importance in their economic relations with man, and in most cases are beautiful in outline and color and possessed of melodious voices.

THE BIRD'S PLACE IN NATURE. Birds are classified between the reptiles, regarded as inferior to them, and the mammals, regarded as superior in general organization. Birds differ from mammals, broadly, in being clothed with feathers instead of hairs, and in the absence of milk-glands, and by sundry differences in anatomy and methods of existence, such as the hatching externally of eggs, and the devotion of the fore limbs to flight. They differ from reptiles in having a covering of feathers instead of scales; a complete double circulation of warm blood; no more than three digits in the manus, long legs, etc.

Affinity with Reptiles.—The differences last noted are, however, of much less importance than those which separate them from mammals, and the structural resemblance is so close that some anatomists, notably Huxley, have included reptiles and birds in a single group, the Sauropsida, comparable to Fishes or Mammals, and completing, with them, the three divisions of the Vertebrata. This grouping was founded upon the fact that birds and reptiles were alike in being oviparous or ovoviviparous; in having a cloaca; in the incompleteness of the diaphragm, and of a corpus callosum in the brain; in having only one occipital condyle; in the presence of a movable quadrate bone and other peculiarities of the skull; and in the fact that the ankle-joint is between two sets of tarsal bones. The close relationship thus implied has been confirmed by the disclosures of paleontology, which show that birds have a reptilian ancestry, and are an offshoot of the same stock as modern reptiles.

Development of the Class.—For details of the geological evidence of the origin and evolution of birds, the reader is referred to the articles BIRD, FOSSIL; and EVOLUTION. It will suffice here to sum up the matter as Prof. A. Newton, following Fürbringer, does in his *Dictionary of Birds* (London, 1893-96). Birds, since they spring from reptiles, must have begun with toothed forms of small or moderate size, with long tails and four lizard-like feet, having well-formed claws, while their bodies were clothed with a very primitive sort of down. To them succeeded forms wherein down developed into feathers, and the fore and hind limbs differed in build—the former becoming organs of prehension (as is still the case in some young birds), and the latter the chief instruments of progression. Then followed a dinosaur-like transformation of the pelvis and legs, and a gradual coalescence of the ankle-bones, enabling birds more and more to walk erect. These early reptilian birds were flightless and terrestrial, or at most climbed trees. "Among those which possessed this habit, the befeathering (which as yet had, like the hair of mammals, served only for

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warmth) presumably entered upon a higher step, the feathers becoming larger on certain parts of the body, particularly on the fore limbs and tail, so as to begin to act as a parachute, and allow of a safe gliding descent from a height. By successive increase in the stiffness and size of the feathers, and corresponding modification and strengthening of the skeleton and muscles, the possibility of incipient but real flight was afforded." Thus far this explanation of primitive bird-formation is theoretical; but at this point comes confirmatory evidence in the fossil remains of Archæopteryx (q.v.)—an actual bird with real feathers and apparently considerable power of flight, that lived at the beginning of Secondary or Mesozoic time. "The faculty of flight, thus acquired, went on improving. The remiges grew stronger and stronger . . . and in proportion as the fore limbs specialized into highly developed wings . . . the tail shortened and was consolidated, the posterior vertebræ becoming united as a pygostyle. Thus originated . . . the higher or better 'Birds of Flight.' This type was established in the Cretaceous Ichthyornis, and includes the vast majority of existing birds commonly grouped as Carinatæ (i.e. with a keeled breastbone — not Ratitæ); but these only in later times developed their various higher modifications, which were rendered possible by the saving of material and weight." It is important, however, to bear in mind that all birds did not reach the highest degree of faculty in flight. "Many stopped, as it were, half way," to continue Newton's summary of Fürbringer's conclusions, "when a retrogression of the power already attained took place; or, if the power were reached, it could not be maintained—an easy life and absence of rivalry inducing an increased bulk of the body, until the utmost exertion of muscular strength could no longer sustain it in the air. Thus when this retrograde movement began, occasion was afforded for the dwindling away of the volant power, and hence arose the different types which are commonly grouped as Ratitæ (ostriches, etc.)."

External Features. Though a strictly scientific arrangement might call for the more basal internal structure to be first considered, it suits present purposes better to give first an account of the exterior—the plumage and epidermal appendages so characteristic of birds.

Plumage.—Feathers are horny products of the epidermal cells of the skin, but very different from mammalian hairs or reptilian scales. Scales, in the herpetological sense, are pieces of the skin itself, originating as folds of the cuticle; and hairs arise from involuted pockets in the skin; whereas feathers are produced from papillæ of the cuticle. They grow so as to form a coat over the whole body, called plumage. (For the structure and characteristics of a feather considered alone, see Feather; for the peculiarities of their growth in 'tracts,' see Pterylosis; and for the periodical loss and renewal of plumage, see Molting.) The origin of plumage can only be surmised. It may well have been that chance variation which marked the earliest divergence from a reptilian stock toward the bird type. It has been conjectured that the primitive plumage was in the form of down, and the probability of this is shown in the fact that at present infant birds are first clothed with down alone. In a large class of birds, mostly of low organization, this down is assumed before the embryo leaves the egg; such are called Dasypædes, and as most of them are sufficiently advanced to begin at once to run about and pick up a living without parental help, they are said to be *pre*-cocial, and their parents classed as Præcoces. Among the higher birds, as a rule, however, the young are quite naked when hatched, and are termed Gymnopædes (or Psilopædes), and these birds are spoken of as altricial (Altrices), because they must feed and care for the young.

Origin and Service of Plumage.—The first and essential service of the feathers is as a coat, protecting the body against cold and atmospheric changes. In the view of Prof. O. C. Marsh, who did more than any one else to collect and reason upon the facts of the origin and development of birds, the acquirement and gradual increase of the feather coat was accompanied by a steadily augmented warmth of blood, and a proportional increase in its activity. The greater activity would result in a more perfect circulation, and this in a steady improvement of general bodily ability and power. If this view be correct, to the acquirement of plumage may be attributed the high degree of development attained in modern birds as a class. The second great service of plumage is its development, on wings and tail, into an instrument of flight. (For the phenomena of flying, see Flight.)

Wings and Their Functions.—Wings, externally viewed, are formed of large quill or flight feathers (remiges), which grow from the posterior margin of the arms and hands in a plane (when outstretched) horizontal with the long axis of the body; they overlie one another at the outer edge so as to slide much beneath one another when the wing is closed, form an aëroplane when distended and quiet, and a series of oars when the bird moves. It is believed that in the development of the wings (Gadow, *Proceedings Zoölogical Society of London*, 1888, page 665) and powers of flight in birds, those feathers nearest the body were the first to become serviceable; but now the most important remiges are those near the outer margin of the wing. These form a set (usually ten, but in some groups nine, and in a few cases eleven), which spring from the bones of the hand and are called primaries; they are long and comparatively narrow, and the shaft is near to the anterior margin. Inside these, springing from the ulna, is a set of lesser and more equally proportioned quills called secondaries, or better, cubitals; these are variable in number, the humming-bird having only six, while the albatross has forty. The fleshy parts of the wing are covered with rows of feathers called coverts, which gradually diminish into the general 'scapular' plumage upon and overlying the shoulder. Wing-feathers vary in length, strength, and shape, according to the mode of life and power of flight in different birds; and there is consequently great variety among birds in respect to the relative size, shape, and power of the wings themselves. The extreme of length, both absolutely and relatively, is found among the oceanic birds, whose lives may be said to be spent upon the wing. The albatross and the condor have wings two and one-half times the total length of the body, reaching an alar expanse of between 11 and 12 feet in large

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specimens, and nearly the same proportions hold for other pelagic wanderers, as the tropic-birds; while in such birds as swifts and hummers the wing may largely exceed the body-length. Such wings belong to birds which range over vast spaces of ocean, or remain poised for long periods in the upper air, as do the vultures and diurnal hawks, or that feed upon flying insects, and so have need of extraordinary sustaining power, endurance, and ability for occasional extreme speed and agility. Such wings are always slender, and sabre-like in outline, when extended, the primaries being usually much longer than the secondaries, narrow and curved, but very strong and far overlapped; those of the diurnal birds of prey are peculiarly narrowed, or 'whittled away' on the inner vane toward the tip. From this extreme, wings grade down in shape to the 'round' or 'short' type characterizing the terrestrial and arboreal birds generally, or those which seek their food in limited areas of quiet water. Here the wing may be considerably shorter than the body, and its feathers broad, the primaries little, if at all, exceeding the secondaries in length—all broadly and evenly vaned, so that the breadth of the wing approaches its length. Such are adapted to quick starting and short, agile 'flitting' flights, rather than to prolonged sustention or swift darting; yet they do not lack power, for many short-winged birds make journeys of hundreds of miles without resting (see MIGRATION), and others are capable of extremely swift motion; but none of them can soar, as do sea-birds and birds of prey, nor equal these in volant grace. All these, moreover, trust for safety rather to hiding than to fleeing from danger.

Degeneration of Wings and Flight-Power.—There is, then, a close relation between the form of wings and the habits of their owner, so far as these involve flight. Hence it might be expected that birds which, for any reason, diminished or were prevented the use of their wings would find these gradually reduced in utility. This, as a matter of fact, has happened. As has already been intimated, there is every probability that the ratite birds (ostriches, cassowaries, and various forms recently extinct) began to be affected in this feature early in the history of the class, and that their present flightless and almost wingless condition, now most extreme in the apteryx (see KIWI), is due to degeneration of these organs, following the acquirement of cursorial habits in treeless regions. The same result came about differently in another direction, where the penguins, developing by untoward circumstances of competition in the Antarctic region, and forced to get their food wholly from the sea, have had their wings utterly metamorphosed from flight-organs into swimming-organs. The related auks of the Arctic regions have continued to find use for their wings, and have retained them in fair condition; but these include an example of how this kind of degeneration of an organ may come about in a species whose home is so restricted and peculiar (perhaps in freedom from natural enemies) that little or no call is made for exercise of the wings—such circumstances as might surround a bird or breed of birds on any of many small and nearly barren islands. The great auk or gare-fowl (*Plautus impennis*), although somewhat more free than in the case supposed, seems to have degenerated to its wingless condition in such a way; and another, more pertinent example is the weka (q.v.) of Tristan d'Acunha, which, otherwise little different from a gallinule, is entirely flightless. Several other instances might be adduced; and the fact that the dodo, dinornis, and other extinct flightless birds were inhabitants of islands, strengthens the thesis. See FLIGHTLESS BIRDS.

Secondary Uses of Wings.—Wings have other uses than for flight. They seem to have been organs for climbing before they were organs for flying, and immature birds of several sorts (see HOACTZIN) still use them in scrambling about branches or through the reeds or over rough ground. They enable many water-birds to dive and swim, by motions under water analogous to flying. They form hiding-places and shelters for the young. "As a hen gathereth her chickens under her wings," was an expression chosen in Holy Writ to enforce the idea of supreme protection. Spread above the nest, they shed rain and hot sunshine from the eggs or tender fledglings. They serve as weapons also, for many birds strike with them very effectively, as our barnyard turkeys show; and in certain forms, as the jacana, chaha (see SCREAMER), and the spur-winged goose, the outer edge of the wing is furnished with one or more spurs which are highly effective as weapons. As a means of expression of the emotions, especially in the nuptial season, wings are utilized in many ways by these highly emotional animals. They are curiously developed, and are fluttered, elevated or spread, or beaten against the body or upon the air, or clapped together over the back, to make drumming or crackling sounds indicative of excitement, and serving as signals or challenges. In some cases certain parts of the wings are modified, as is the case in the snipe (q.v.), where some of the uttermost primaries are shaped so as to make a distinctively audible noise in flight (when desired) known as bleating; and still more strangely in the case of certain manakins. In color, wings are likely to be plain—at least so far as the quill-feathers are concerned. The proudly displayed wing-colors of the sun-bittern (see Plate of BUSTARDS) is one of a few exceptions. Ordinarily there are bars of white, and in the case of the ducks a brilliant metallic 'speculum,' and the linings of wings are often more beautiful than the outside. Frequently, however, there are present other sexual characters, more or less transitory, in the form of elongated plumes, as in the argus pheasant, the standard-wing (see Plate of NIGHTJARS), and some of the birds of paradise (q.v.). These belong to the male alone, and may or may not be permanent. Their explanation and history comes under the domain of 'sexual selection' (see NATURAL SELECTION). Lastly, wings seem to offer the privacy and darkness grateful to tired nature, for a bird desiring to sleep usually 'tucks its head under its wing.'

The Tail.—The tail, like the wings, presents great variety as to form and serves sundry purposes. It may be invisible, as in the apteryx, a downy tuft, as in the dodo, very short, broad and stiff, or very long, flexible and narrow, plain and simple or highly ornate. Like the wings, it is composed of large quill-feathers called rectrices, the insertion of which is concealed by under and upper coverts, either of which may

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sometimes be transformed into highly ornamental plumes. The tail-feathers grow in pairs, the reason for which arrangement is shown by Archæopteryx, where each vertebra of the lizard-like tail supported one on each side. The reduction of this long caudal skeleton to a pygostyle, and the consequent crowding of the feathers upon a short base, seems to have produced the modern fan-shaped tail. "The normal number of rectrices is 6 pairs, but a few birds possess 10 or 11; several 9, 8, or 7; many only 5, and Crotophaga (anis) only 4—the diminution being brought about by the suppression of the outer pair or pairs." The main purpose of the tail, which is capable of much movement, is to assist the bird to balance, check, and guide itself. There seems, however, to be no relation between the size and shape of the tail and the character of the wings, though its shape is pretty constant within each order. Thus most of the sea-birds, water-fowl, waders, and game-birds have short, compact, inconspicuous tails, until we come to the pheasants, where they are likely to be exceedingly long and showy. The pigeons and their allies have broad tails, and those of the birds of prey are stout and square. The picarian families are mostly possessed of tails, which are long, or strikingly colored, as notably in the trogons and some cuckoos, or marked with peculiarities of form as in the motmots, or are the subject of special ornamentation as among the humming-birds. In the great tribe of Passeres the utmost variety exists, the magnificent lyre-bird (see Plate of LYRE-BIRD, etc.) coming next to the bob-tailed pittas; and here, among the short-tailed finches, warblers, and thrushes, are found birds capable of such caudal displays as those of the paradise-birds, sunbirds, some jays, etc. This shows that the essential service of the tail in flight may be performed by an appendage of almost any shape, and that the conspicuous, flexible, and somewhat unimportant nature of the organ has caused it to be influenced by natural (and especially by sexual) selection in an usual degree as a means of displaying sexual ornamentation and emotion. This is the explanation of the possession by male pheasants of their magnificent trains, of the gorgeous array spread by the peacock (though here it is really the tail-*coverts*), which he rattles nervously, as if to call attention to the show; of the symmetrical beauty of the lyre-bird's tail; and of the amazing caudal ornaments of birds of paradise. (See Plates of PEACOCKS; LYRE-BIRDS; BIRDS OF PARADISE.) "The motmot," remarks F. M. Chapman (see MOTMOT, for interesting details), "gesticulates with its tail in a remarkable manner, swinging it from side to side, so that it suggests the pendulum of a clock, or sweeping it about in circles with a movement which reminds one of a band-master flourishing his baton. We shall find in other species, also, that the tail, more than any other organ, is used to express emotion. Recall its twitching and wagging: how it is nervously spread or 'jetted,' showing the white outer feathers, as in the meadow-lark. The tail may be also expressive of disposition. Compare the drooped tail of a pensive fly-catcher with the uplifted member of an inquisitive wren."

Crests, Combs, etc.—Crests in very great variety, usually able to be elevated or depressed at the will of the bird, and ornamental plumes or tufts of feathers, such as the aigrets (see AIGRET) of herons, and the 'tassels' hanging from the turkey's breast, are developments of the plumage that might properly be discussed here; but the limitations of space compel a reference instead to the biographies of the various birds that exhibit them. The beak and head-appendages, such as combs, wattles, carunculated ceres, 'helmets,' etc., are, however, dermal growths, which require mention; as also will the coverings of the feet.

The Beak.—The beak, bill, or neb of a bird is formed of two horny sheaths, overlying bony supports, and forming the mouth and food-getting organ of a bird. It consists of two *mandibles*, an upper and a lower, into which the foremost bones of the skull are produced, all appearance of lips being lost. It is not furnished with proper teeth, although rudiments of them have been observed in the embryos of some parrots; and the marginal laminæ with which the bills of many water-fowl are furnished partake of the same character, being secreted by distinct pulps. The resemblance of these marginal laminæ to teeth is particularly marked in the merganser (q.v.). The bills of birds differ much, according to their different habits, and particularly according to the kind of food on which they are destined to live, and the manner in which they are to seek it. In birds of prey, the beak is strong; the upper mandible arched or hooked, and very sharp; the edges sharp, often notched, and the whole beak adapted for seizing animals, and tearing and cutting to pieces their flesh. A powerful, short, hooked beak, sharp-edged and notched, indicates the greatest courage and adaptation to preying on living animals. The beak of the vulture is longer and weaker than that of the eagle or falcon. In birds which feed on insects and vegetable substances, the hooked form of the beak is less common, though well marked in parrots; those birds which catch insects on the wing, such as the night-jars, swifts, etc., are remarkable for the deep division of the beak, and their consequently wide gape, and an analogous provision to facilitate the taking of prey is to be observed in herons, kingfishers, and other fishing birds; but the object is attained in their case by the elongation of the beak, whereas birds which catch insects on the wing have the beak very short. Birds which feed chiefly on seeds have the beak short and strong, for bruising them; while the beak of insectivorous birds is comparatively slender.

Many aquatic birds have broad, comparatively soft and sensitive bills, with laminæ on the inner margin for straining the mud from which much of their food is to be extracted; other birds, as snipes, avocets, etc., seeking their food also in mud, have slender bills of remarkable sensibility. As the varieties of form roughly distinguished the larger and more obvious of the groups of birds, the bill was made the standard for the early classifications, giving such group-names as Dentirostres, Conirostres, etc., no longer of scientific value. The modifications of form are very numerous, and the peculiarities of the bills of toucans, hornbills, spoonbills, crossbills, parrots, humming-birds, etc., are very interesting, and intimately connected with habits. Some of the modifications, however, are sexual and transitory, such as the knob on the beak of the pelican, and the deciduous parts of that of

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the puffin. At the base of the upper mandible, a portion of the beak is covered with a membrane, called the *cere* (Lat. *cera*, wax, from the waxy appearance which it presents in some falcons, etc.), which in many birds is naked, in others is feathered, and frequently is covered with hairs or bristles. The nostrils are situated in the upper mandible, usually in the cere, but in some birds they are comparatively far forward, and in some, as puffins, they are very small and placed so near the edge of the mandible as not to be easily detected. They are more or less open, or covered with membrane, or protected by hairs or feathers. Besides their principal use for seizing and dividing or triturating food, the bills of birds are employed in a variety of functions, as dressing or preening the feathers, constructing nests, etc. They are also the principal instruments used by birds in their combats.

The Feet.—The feet of birds vary considerably, according to their mode of life. In some the claws are strong and hooked, in others short, straight, and weak; in some the toes are all separate, in others more or less connected; in birds especially adapted for swimming they are generally *webbed* or united by a membrane; in other swimming birds, however, a membrane extends only along the sides of each toe. A large group of birds, including woodpeckers, parrots, etc., have two toes before, opposed by two behind, the foot being thus particularly adapted to grasping irregular surfaces and facilitating climbing. These distinctions were seized upon by the early ornithologists as a means of classification, which gave us such obsolete group-names as Scansores, Rasores, etc., which only partly coincide with the more scientific groupings now accepted. In most birds the tibia is feathered to the heel-joint; in some, however, and particularly in *waders*, the lower part of it is bare; the shank and toes are generally destitute of feathers, and are covered with scaly skin, and the arrangement of these scales has been much studied. "The most primitive form of the horny covering of the feet," according to Stejneger, "seems to be its division into uniform hexagonal scales, and is called reticulate; the next stage is when some of these scales fuse together forming what are termed scuta, or scutella; . . . still further specialization is indicated by the tarsal scuta fusing into a continuous covering, which, in its extreme development, embraces both the front and the back of the tarsus, as in some of the higher groups of passerine birds; such a tarsus is said to be 'booted.'" Feet, like beaks, have certain accessory or changeable parts; thus in the grouse family there is a seasonal molting of the sheaths of the claws. The most important appendage, however, is the spur or series of spurs, which arm the 'heels' of certain gallinaceous cock birds, and form serviceable weapons among this class, whose beaks are ill adapted to use as weapons, so that they strike with feet and wings in their combats. The extraordinary development of the legs and feet in ratite birds will be found described under MOA, OSTRICH, and similar titles.

Oil-Gland.—The skin of birds has no sudoriferous nor sebaceous glands, but on the rump at the base of the tail (on the 'pope's nose') is a bilobed gland containing oily matter, which is present in all birds except the Ratitæ, bustards, and a few others. This secretion seems useful only for cleaning the plumage, and the bird squeezes a little out upon its beak before preening its feathers. In the oil-bird the secretion is excessive, and that of the hoopoe has a very disagreeable odor.

INTERNAL STRUCTURE. *Skeleton.*—The theory and facts of ancestry related above are enforced by comparative anatomy, which finds in the structure of birds a close resemblance to the internal structure of reptiles. Birds, nevertheless, possess distinctive anatomical features fully entitling them to rank as a separate class. In general form the body is spindle-shaped, tapering forward from the shoulders to the head, with the feathers sloping backward, and again diminishing toward the tail; this is adaptive to progress through the thin media of air and water inhabited by birds; and the weight is thrown forward, securing proper balance for the normally horizontal position. In order to secure this there is a concentration of muscles and other organs in the region below the point of suspension of the wings. Not only are the fleshy portions of the legs mainly confined to the upper portions of these limbs, but the muscles which elevate the wings are actually placed on the under instead of the upper surface of the body.

Though the neck is sometimes much prolonged, the body is very compact and rigid. The backbone consists of vertebræ having (typically) saddle-shaped, articular facets, and many processes and ligaments which lock them firmly together; moreover, the vertebræ of the back generally become ankylosed or firmly united together by cementing bone, the solidity thus acquired being for the support of the ribs, and these also are proportionately stronger than is usual in mammals; each of them is provided in the middle with a flattened bony process, directed obliquely backward to the next rib, so that they support one another, and they often become ossified with the sternum, giving unusual rigidity and strength to the thoracic framework. The hinder part of the spine is consolidated with the pelvis, and the tail, primitively long, has become shortened into a few small movable vertebræ terminating in a short and generally much elevated bone, consisting of ankylosed vertebræ, called the pygostyle, or plowshare bone.

In contrast to the general stiffness of the vertebral column in the trunk, it is remarkable for great flexibility in the neck, enabling a bird to make ready use of its bill, or to bring its head into such positions as suit the adjustment of the centre of gravity in flying, standing, etc.; there are also certain peculiar ligamentous bands, by which birds can retain the neck in the customary S-curve without muscular exertion. The first (atlas) and second (axis) vertebræ are modified to form an articulation with the head, which is completed by a single globular condyle (as in reptiles), forming a sort of pivot, and enabling the head to be turned around with a freedom and to an extent impossible to the mammalia; and the fact that it is formed almost wholly by the basioccipital bone constitutes a fundamental distinction between birds and the reptiles on one side and the mammals on the other.

The Skull.—The skull is formed of bones corresponding with those of man; but they can be distinguished only when the bird is very young, soon becoming consolidated together. The braincase "is more arched and spacious, and is larger,

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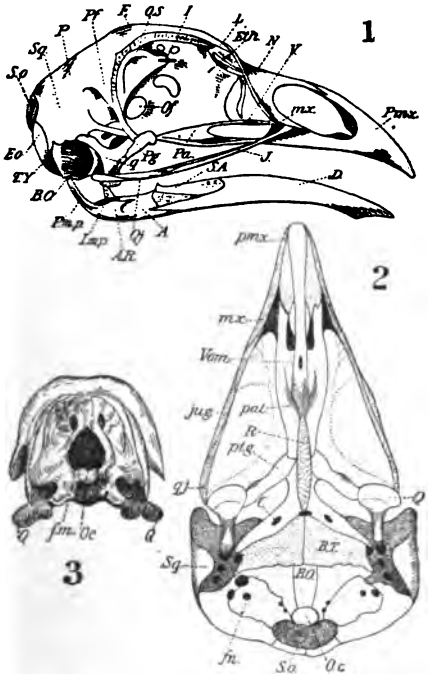
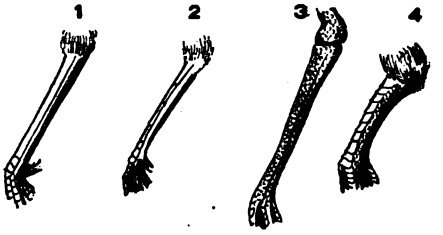
in proportion to the face, than in any reptilia" except pterodactyls. The jaws are much elongated, so as to form the bill, the outward shape of which, however, formed by the horny sheath, may be very different from that of its bony supports, in adaptation to habits of use. The upper mandible is formed anteriorly and mainly of the præmaxillæ and posteriorly by the paired maxillaries and other bones, varying greatly in relative position and importance, and in many birds movable, so that the upper jaw is capable of a certain amount of up and down motion as on a hinge. These and other elements form a palate, the varying bony arrangement of which has been used with disputed success as a basis for general classification in ornithology. The lower jaw is formed of several elements now fused solidly together; and it is connected with the skull by the quadrates and other lesser bones and by a series of elastic cartilages permitting extreme movability and large expansion of the gape.



BONES OF THE SKULL OF A FOWL.

1. Side View; 2. Lower Surface and Palate (the lower jaw having been removed); 3. Rear, or occipital, aspect. *So*, supra-occipital; *Sq*, squamosal; *Oc*, occipital condyle; *P*, parietal; *Pf*, postfrontal; *F*, frontal; *OS*, orbito-sphenoid; *I*, inter-orbital septum; *Eth*, ethmoid; *L*, lacrymal; *N*, nasal; *V*, *Vom*, vomer; *mx*, maxilla; *Pmx*, premaxilla; *Of*, optic foramen; *Q*, *q*, quadrate; *Pg*, *ptg*, pterygoid; *Pa*, *pal*, palatine; *R*, rostrum; *J*, *jug*, jugal; *QJ*, *qj*, quadrato-jugal; *Eo*, ex-occipital (lateral occipital); *TY*, tympanic cavity; *BO*, basi-occipital; *P.m.p.*, posterior mandibular process; *I.m.p.*, internal articular process; *AR*, articular; *A*, angular; *SA*, supra-angular; *D*, dentary; *C*, choana (one of the pair of inner narial openings); *BT*, basi-temporal; *fn*, formina for cerebral nerves.

Legs.—The limbs of birds conform to the vertebrate type, with certain modifications, which are least in the hinder pair. They are attached to the 'pelvic arch,' which in birds consists of some solidified sacral and coccygeal vertebræ and the paired pelvic bones (ilium, ischium, and os pubis), which latter meet to form a cup in which rests the head of the femur. When one considers how far behind the centre of gravity of a bird's body the hip-joint is placed, and how it must sustain the whole weight of the body under



TARSAL ENVELOPES.

1. Booted. 2. Scutellate. 3. Reticulate. 4. Reticulate-scutellate.

unfavorable circumstances, as well as provide for the leverage of the muscles of the thigh, the necessity for this consolidation, breadth, and massiveness will be perceived. The thigh is short, and concealed within the body; the next division, often mistaken for the thigh, is the leg, strictly so called, or *tibia* and *fibula*, which ends at what is really the ankle-joint, although popularly regarded as the knee; and beneath this is the shank commonly called the *tarsus*, which in some birds is very long, serving as a part not of the foot, but of the leg, and formed by a compound bone, composed of the united metatarsal bones, with the upper end of which four tarsal bones are fused. Thus the ankle-joint is not between the tarsus and metatarsus, but between two series of tarsal bones. The tibia is therefore properly a tibiotarsus, and the so-called tarsus is really a tarsometatarsus. The feet are divided into toes, which are four in number, three before and one behind, differing from each other in length and in the number of joints or phalanges of which they are composed, the hallux, which is directed backward, being in general comparatively short, and consisting of two joints only. No fifth toe is known, and the hallux (first toe) is absent in the Struthiones, which have lost also the second, while the fourth is diminished, throwing the work almost alone upon the third, or middle toe.

Wings and Shoulder-Girdle.—The anterior limbs or wings of a bird are the fore limbs of other vertebrates modified for the purposes of flight. They were attached to the shoulder-girdle or pectoral arch of the skeleton, which in this class is of extraordinary strength and importance. It consists of the thoracic case formed by the dorsal vertebæ, the true ribs and the breast-bones (sternum), which are connected by ligaments and ossifications. All the bones of birds are dense and hard. The sternum is remarkably large and strong, serving for the attachment of the muscles which depress the wings. It generally exhibits a projecting ridge, or keel, along the middle, which is proportionately largest in birds of most powerful flight or swimming ability, and is wanting only in the flightless birds (see above). This plate ossifies only as the bird matures, being in early life a cartilage, the flexibilty of which may easily be felt in young fowls, affording housekeepers a test for alleged 'spring' chickens. The variations in form of the sternum are of considerable taxonomic significance. Outside and attached to this case

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on each side, at a point as high and forward of the centre of gravity as feasible; is the framework of the shoulder-joint, braced against the tremendous leverage of the wings: it consists of the scapula, or shoulder-blade, a coracoid and a clavicle, the junction of which forms a cup in which rests the head of the humerus. The scapula is a more or less sabre-shaped bone placed above the ribs, and lying parallel to the spine imbedded in muscles and firmly attached (sometimes fused) at the forward extremity to the head of the coracoid. The coracoid is a pillar-like bone which serves as the main support of the shoulder, "for while at one extremity it sustains the wing, at the opposite end it is firmly united to the front of the sternum. A third brace is afforded by the combined clavicles, which curve downward and backward from the shoulder-joint, imbedded in muscles, and unite under the neck, and just in advance of the sternum, to form the furculum (fork), which we know as the 'wish-bone', and the English call 'merry-thought.'" See FOLK-LORE.

The wing-bones are homologous with those of the arm in other vertebrates, but have become modified in both form and relative position to adapt them to the requirements of flight. "The fore limb of a bird, when in a state of rest," says Huxley, "exhibits a great change of position if it be compared with that of an ordinary reptile; and the change is of a character similar to, but in some respects greater than, that which the arm of a man presents, when compared with the fore limb of a quadruped mammal. The humerus lies parallel with the axis of the body, its proper ventral surface looking outward. The forearm is in a position midway between pronation and supination, and the manus is bent back upon the ulnar side of the forearm, in a position not of flexion, but of adduction."

The humerus is usually short as compared with the radius and ulna (the latter is more curved and stouter than the former) which together form the forearm and main stretch of the visible wing; these remain separate, and at their outer extremities articulate with the two small bones of the wrist (carpus) which alone remain free. The other, distal, carpal bones "fuse in the embryo with the proximal end of the three first metacarpals, and all trace of their originally separate existence disappears." The metacarpus consists of three bones (I., II., III.), which are more or less flattened and fused. The first bears the pollex or 'thumb' (whence springs, in some birds, the bastard wing or alula), and the second the index finger, which is long, straight, and has two, or sometimes three, phalanges. These bones complete the wing, except that a few species have a rudimentary third finger. Archæopteryx, however, had three well-developed fingers, all armed with claws; and in embryo ostriches a claw sometimes appears on the third finger. Such is the bony framework of the wings, operated by muscles of immense power (the pectoral muscles are said to make about one-fourteenth of the weight of the whole body in birds of prey, and one-eleventh in a wild goose); but their usefulness depends upon the external furniture of feathers, heretofore described, which forms the expanse necessary for buoyancy and flight (see below).

MUSCULAR SYSTEM. The muscles of birds conform, in general, with the vertebrate type, though the homologies, especially about the fore limbs, are sometimes obscure. For these homologies, Newton's review in Bronn's *Thier-Reich* (*Vögel*, pp. 9-325) is complete, and is epitomized in the former's *Dictionary of Birds*, pp. 602-620. Specified arrangements of muscles and tendons, especially the plantar tendons, have been much experimented with as a basis of classification, but the results have not proved of great value, when taken alone. Only a few general considerations need be presented here. The muscular system of birds is characterized by an extraordinary strength in those parts concerned with activity and endurance, and has certain interesting automatic functions. Thus the vast pectoral muscles attached by a broad fleshy base to the sternum and narrowing to a complicated tendonous attachment to the wing-bones, are mainly two, forming the thick whitish 'breast' of edible fowls; they depress the wing—the effective movement in flight. An elastic band in front of the wing passes from the head of the humerus to the carpal joint; when the wing is extended it is stretched about three times its ordinary length, and its natural contraction enables the bird to keep the wing closed without effort. As it lies just beneath the skin, it is easily cut, and as such a severance prevents the wing from being firmly extended, it offers the best method of rendering captive birds incapable of flight; to disable one wing is quite enough. See MUSCULAR SYSTEM, EVOLUTION OF.

"In the hind limb of most birds there is a singular extensor muscle, which arises from the pubis, ends in a tendon which passes to the outer side of the knee-joint, and terminates in the leg by uniting with the flexor digitorum perforatus. The result of this arrangement is, that the toes are flexed whenever the leg is bent upon the thigh, and, consequently, the roosting bird is held fast upon his perch by the weight of his own body." (Huxley, *Anatomy of Vertebrated Animals*, New York, 1878.)

VISCERAL SYSTEM. The digestive apparatus of birds resembles that of mammals; exhibiting, however, various modifications, according to the different kinds of food—some birds feeding on flesh, others on fish, others exclusively on insects, others on seeds, others more indiscriminately on a variety of animal and vegetable substances. Few birds masticate their food in any degree; upon being swallowed, it enters the *crop* or *craw*, an enlargement of the œsophagus situated just before the breast-bone, where it is moistened by saliva and partly digested, so that its contents, easily regurgitated, form a suitable food for nestlings in some families, as, notably, the pigeons. The crop is wanting in the ostrich, and also generally in birds that feed on fish, and is of greatest size in those of which the food consists of seeds or grain. It is generally single, and on one side of the gullet; sometimes, as in pigeons, it is double. A second dilatation of the œsophagus, called the *proventriculus*, is generally largest in those birds in which the crop is wanting or small; and in this the food is further softened and chemically treated. The third and principal stomach is the *gizzard* (q.v.), which in birds of prey, fish-eating birds, etc., is a mere membranous sac, but in birds which feed on grain or seeds is very thick and muscular,

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so that it acts as a sort of mill, and with extraordinary power. In these birds, also, the grinding down of the contents of the gizzard is assisted by the small rough pebbles or grains of sand constantly swallowed, as is well exemplified in domestic fowls. The liver and pancreas are usually large, as also are the kidneys; but there is no urinary bladder, and the urine, which contains very little water, is at once poured into the *cloaca*, an enlargement of the terminal portion of the intestine. The intestine varies greatly in capacity and length, being 'short' in all purely frugivorous and insectivorous birds, and 'long' in those which live upon fishes, carrion, grain, and grass; its walls differ in structure from the mammalian and agree with the reptilian type. The diaphragm is incomplete and differently arranged from that of mammals. See ALIMENTARY SYSTEM, EVOLUTION OF.

Food.—The amount of food required to sustain the high temperature and great bodily activity of birds is excessive, when compared with that required by other animals of proportionate size; and young, growing birds tax the food-getting abilities of their parents to the utmost. Many facts might be quoted in support of this, such as that of Aughey's confined plovers, which ate an average of 200 locusts and similar large insects each day; fledglings habitually consume more than their own weight of food between sunrise and sunset—sometimes twice as much. Adult birds eat almost continuously, and digestion is extremely rapid, the process being completed in from one to two hours in small birds. This ability for enormous consumption makes the birds of vast value to man in the reduction of insect pests; it also limits the time birds may fast, so that unless they can fly with very great rapidity, long journeys cannot be undertaken, and the fact that most birds are able to make great speed is probably an achievement of natural selection related to this very characteristic. On the other hand, birds show considerable ability to adopt a new diet, and adapt themselves to it healthfully. The writings of Dr. F. E. L. Beal, Prof. S. A. Forbes, and others, published in the documents of the United States Department of Agriculture, and by the governments of Illinois and other States, contain much information on this subject.

Respiration in Birds is rapid and copious, and the pulmonary system includes not only a pair of rather large lungs, but a system of 'air-sacs,' by which air is distributed throughout the body. These air-sacs are of two kinds. One consists of membranous expansions of the lungs, which lie among the tissues in the form of inflatable bags controlled by muscles, so that they can be emptied and filled at the will of the bird; they occur in all parts of the body and penetrate beneath the skin and inside many bones, but in varying amount. It is popularly believed that all bird-bones are hollow, but this is far from true. "Generally, the skeleton is most pneumatic in large birds that fly well, like vultures, storks, swans, and pelicans; less so in small birds, and least in heavy or little-flying water-birds. However, there are many exceptions. While, for instance, most of the bones of many Passeres, of swifts, divers, rails, the kiwi, and of terns, are solid, and air-cells are restricted chiefly to the cranium, many parts of the skeleton of the large Ratitæ are very pneumatic. The greatest development of pneumatic cells exists in the screamers and hornbills, in which even the fingers and toes, in fact, any part of the skeleton, are hollow. . . . It is well known that a bird which has its humerus shattered by shot can for some time breathe, although its beak and nostrils be tightly closed, and thus be submitted to unnecessary, excruciating pain. Compression of the thorax and abdomen suffocates a wounded bird better than strangulation." See RESPIRATORY SYSTEM, EVOLUTION OF; ANIMAL HEAT.

The functions of these air-sacs are not very evident. They serve to ventilate the rather incontractable lungs, and from them issues the air which inflates the 'drums' in the neck of the prairie chicken, the gular pouches of the adjutant stork, the 'horn' of the bell-bird (q.v.), and that extraordinary swelling of the throat which marks excitement in the pectoral sandpiper (see Colored Plate of SHORE-BIRDS). These inflations are characteristics of male birds only, and appear only in the spring. The air-sacs also assist in furnishing a continuous current of air enabling some singing birds to maintain a long strain of melody, such as the nightingales.

Arterial Circulation.—Conformably with this copious aëration, and the habits of activity, the circulation of the blood in birds is rapid, the heart beating 120 times a minute at rest, and nearly doubling this rate at the first stroke of the wings; and its temperature (from 100° to 112° F.) is considerably higher than in mammals. The heart resembles that of the mammalia in its form and structure; but the right ventricle, instead of a mere membranous valve, is furnished with a strong muscle to impel the blood with greater force into the lungs; and the carotid arteries are peculiar. During incubation there is a congestion of blood in the enormously dilated vessels of the abdominal wall, forming the 'brood-organ.' The red corpuscles are, on the average, twice as large as those of man, and elongated, as in reptiles, rather than round, as in most mammals. See CIRCULATORY SYSTEM, EVOLUTION OF.

Reproductive System.—Birds are distinctly male and female, cock and hen. The females possess a pair of ovaries (of which only the left one is functional as a rule) situated in the 'small of the back' at the front end of the kidney. The ovary consists of a grape-like cluster of germinal eggs, which during the breeding season exhibit all stages of size and ripeness, but in winter are reabsorbed, so that the determination of sex by dissection at that season is difficult. The ripe egg passes down tubular passages (oviducts) in which it receives, in certain 'uterine' expansions, its coverings of albumen and shell, to the right side of the rectum, and thence is voided in a more or less advanced state of development, which is completed by incubation or its equivalent. The testes of the male are a pair of glands, situated as are the ovaries, from which the spermatic ducts lead to the cloaca. (See EGG and EMBRYOLOGY.) All birds lay eggs, some only one, others as many as twenty, the number seeming to depend upon the average chances of reaching sexual maturity possessed by each species. With rare exceptions, these eggs are cared for by the parents, and all birds of higher organization prepare receptacles (nests) for them, and furnish by brooding the continuous

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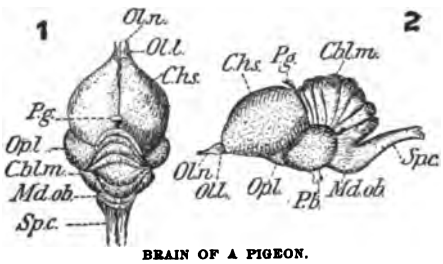
warmth necessary to their hatching—a process which requires from two to six weeks according to size and other factors. This necessity has developed a body of instincts, habits, and mental and structural characteristics, which include the most striking, significant, and interesting facts of bird life and history. See NIDIFICATION.

NERVOUS SYSTEM. The nervous system of birds is highly developed, but presents few salient differences from the vertebrate type. There is a perceptible improvement of the brain over that of reptiles, more especially in the increased proportional development of the cerebral hemispheres; but the surface-convolutions and other features that play so important a part in the



BRAIN OF A PIGEON.

1. Dorsal Aspect; 2. Lateral Aspect: *Ol. n*, Olfactory nerves; *Oi. l*, Olfactory lobe; *C. hs*, Cerebral hemisphere; *Cblm*, Cerebellum; *P. g*, Pineal gland; *Op. l*, Optic lobe; *Md. ob*, Medulla oblongata; *Sp. c*, Spinal cord; *P. b*, Pituitary body.

brains of the higher mammals are absent or merely indicated. In this, and in the way the cerebral nerves originate, the brain remains nearly reptilian. The sympathetic system is highly developed, as would be expected in creatures of such activity and sensitiveness. See NERVOUS SYSTEM, EVOLUTION OF.

The Senses of Birds, as a whole, equal those of most mammals, and in some directions are superior to those of other animals. Taste is, perhaps, feeblest, the horny nature of the jaws and the character of the food not favoring the development of this sense in birds; yet a certain amount of discrimination is undoubtedly exercised by them, apart from the guidance of touch and smell. Odors affect birds also, but to a less degree probably than is frequent among even reptiles, not to say mammals; and it is probable that even the carrion-eating species depend little upon their sense of smell in guiding them even to odoriferous food. Birds owe less to the sense of touch than many other creatures, for they have few tactile organs, the bristles about their beaks having other purposes, mainly. The bills of some mud-hunting species, however, are specialized in this direction (see DUCK and SNIPE). In respect to hearing, birds are well endowed, having the internal apparatus of the ear (see EAR) highly perfected, and exposed to the vibrations of the air through a cartilaginous meatus with a fairly wide opening. One function of the ears of birds, as well as of other creatures, seems to be to inform the animal as to its relations with space, balance, direction, etc. Whether or not this is to be regarded as a sense, is undecided. There is no external ear, the nearest approach being in the nocturnal owls (where the organ presents other peculiarities—see OWL), though the so-called 'ears' of some of those birds are merely tufts of feathers which have nothing to do with audition. Moreover, this faculty in birds extends beyond mere quick perception of sounds to 'the power of distinguishing or understanding' pitch, notes and melodies, or music; and it has been an important factor in the development of bird-singing.

The vocal performances of birds are one of their foremost and most pleasing characteristics; yet of only a few, in the most highly organized classes, can it be said that they sing. Even in the order called 'singers' (Oscines), many make little melody, though, like the crow, they may utter a long list of significant notes—a real language, which is developed among birds generally to a degree realized by few. The vocal mecha-

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ANATOMY OF BIRDS.

1.—Limbs as related to the general skeleton: *Sca*, scapula; *hu*, humerus; *cor*, coracoid; *r*, radius; *ca*, carpus; *dl*, *df*, digits; *c.m.t.c.p*, carpometacarpus; *st*, sternum; *kl*, keel of sternum; *ul*, ulna; *py*, pygostyle; *fe*, femur; *fi*, fibula; *t*, tibiotarsus; *t.m.t.s*, tarsometatarsus.

2.—Vertebræ of the tail and plowshare bone (pygostyle).

3.—Shoulder-girdle and carinate sternum: *Fu* (*cl*), furculum or 'wishbone' (clavicles); *g*, glenoid cavity for humerus; *Sca*, scapula; *v*, vertebral portion of rib; *s*, sternal portion of rib; *un.p.*, uncinate process, *Cor*, coracoid; †, articulation of coracoid with sternum; *st*, sternum; *kl*, keel (carina) of sternum.

4.—Non-carinate Sternum (of a ratite bird): *Cg*, *cg*, coracoid grooves; *alp*, *alp*, lateral processes of anterior end; *pe*, posterior end; *kl*, position of keel.

5.—Side view of the right side of the Pelvis of an adult Fowl: *Il*, ilium; *Is*, ischium; *Pb*, pubis; *dl*, dorso-lumbar vertebræ; *Cd*, caudal vertebræ; *Am*, acetabulum, with its perforated floor; *P*, pygostyle.

6.—Wing of a Fowl, embryo (x) and adult (y): *R*, radius; *U*, ulna; *r*, radial carpal; *u*, ulnar carpal; *cd* 1, 2, 3, distal carpals; *M* 1, 2, 3, 4, metacarpals; *Ph*, phalanges. This exhibits coalescence of bones with age.

7.—Viscera (of a Duck): *T*, trachea ending below in syrinx (see Fig. 14): *H*, heart; *v*, portion of anterior wall of the body cavity; *Co.f.lig*, coraco-furcular ligament; *P*, axillary sac (lying between the coracoid, scapula, and the anterior ribs, and communicating with the sub-bronchial air-sacs); *S*, sub-clavius muscle; *Lg*, lung; *Cor*, coracoid; *Pa*, pectoral artery; *Pv*, pectoral vein; *Pul.a*, pulmonary artery; * point of entrance of bronchi into lungs; *S*, *S*, partition walls between the anterior intermediate air-sacs; *S1*, *S1*, partition walls between anterior and posterior intermediate air-sacs; †, anterior intermediate air-sacs; ††, posterior intermediate air-sacs: *F.os.*, fibrous oblique septum; *P*, pectoralis major; *F*, furcula; *S.lig.*, suspensory falciform ligament; *r.cL.*, right coronary ligament of the liver; *l.cL.*, left coronary ligament of the liver; *r.Abd.s.*, right abdominal posterior air-sac; *l.Abd.s.*, left ditto; *Oe*, œsophagus; *Aa*, innominate artery; and *Va*, innominate vein, with their branches.

8.—Convoluted windpipe (of an ibis): *W*, windpipe (trachea), *Fu*, furculum; *Cor*, coracoid; *r.b.*, right bronchus; *l.b.*, left bronchus; *St*, sternum.

9.—Alimentary canal (of a Fowl): *œ*, œsophagus; *in*, crop; *pr*, proventriculus; *gl*, gizzard; *d*, duodenum; *sm*, lower part of small intestine; *ic*, intestinal cæca; *r*, rectum; *cl*, cloaca; *l*, liver; *gb*, gall-bladder; *p*, pancreas; *u u*, ureters; *ov*, left oviduct (the right oviduct is rudimentary).

10.—Muscles of the wing (of a Goose): *Bi*, biceps; *Elast. Sec*, vinculum elasticum; *Exp. sec*, expansor secundiorum; *Lig*, ligament; *Mpt*, metapatagium; *Pect*, pectoral muscle ('breast'); *Propt*, propatagium; *Pt. lg*, and *Pt. br*, long and short propatagials; *Tri*, triceps.

11.—Muscles of the Leg: *Glut. 2*, gluteus maximus; *Glut. 4*, gluteus medius; *Glut. 4*, gluteus minimus; *Glut. ant*, gluteus anterior; *Vast's*, vastus externus and vastus internus; *Obd. intern*, obturator internus; *Crureus*, crureus; *Semitend*, semitendinosus: *Femo-Caudl*, femero-caudal; *Biceps*, biceps femoris; *Ambiens*, ambiens; *Longs. hall*, longus hallucis.

12.—Structure of the inner Ear: *Q*, quadrate bone; *Pter*, right pterygoid; *F.M.*, foramen magnum; *Cd*, occipital condyle; *L*, lagena; *Co*, columella auris; *H*, horizontal semicircular canal; *S*, sagittal semicircular canal.

13.—Section across the Nasal Channel of a Bird's Beak.

14.—Typical form of a bronchial Syrinx in Passerine Birds: *a*, front view; *b*, side view, showing position of external tympanic membranes; *tc*, tracheo-clavicular muscles.

15.—Plantar Tendons (Passerine type); *fp*, flexor perforans, dividing to 2d, 3d, and 4th toes; *fh*, flexor hallucis.

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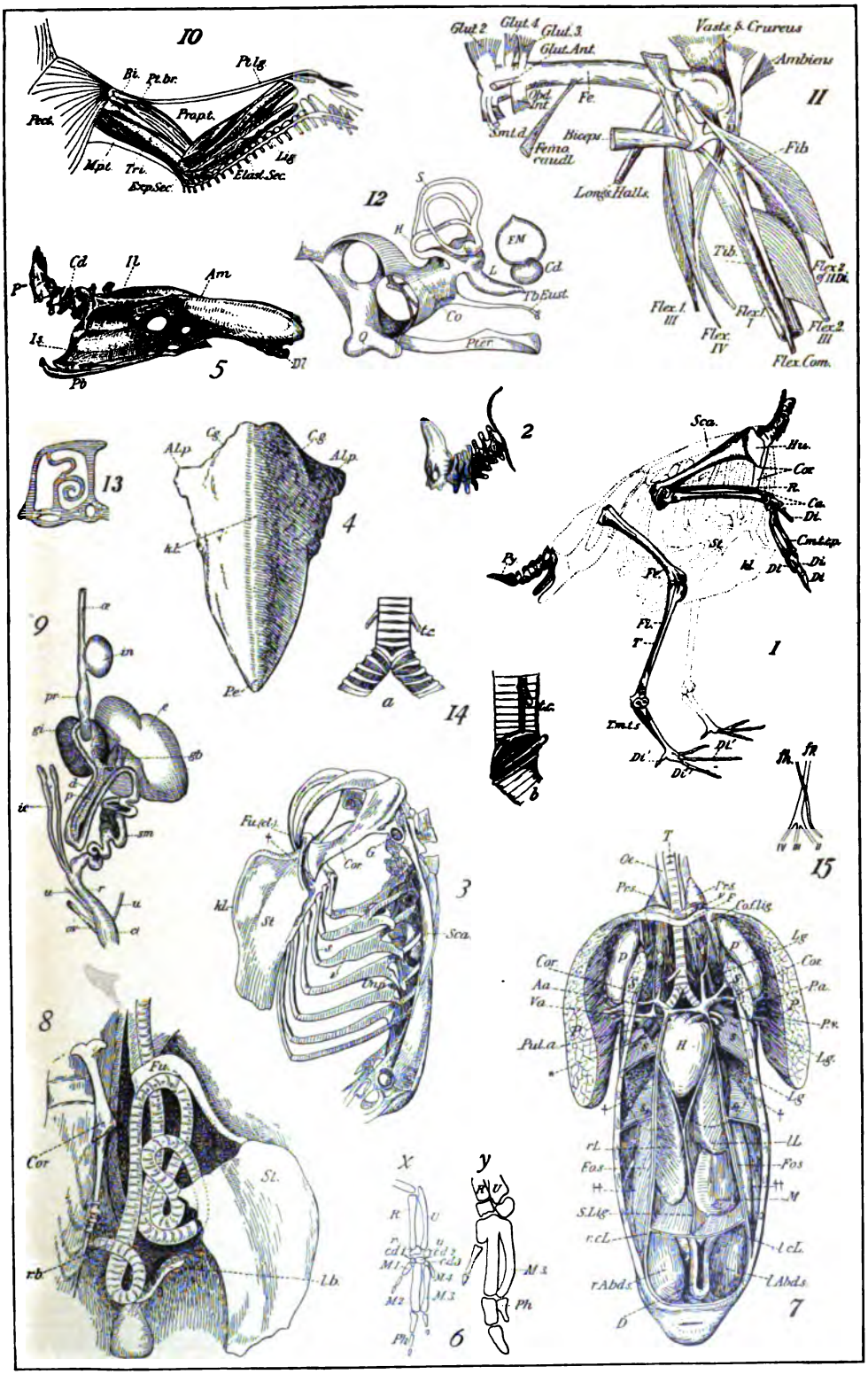

For Description see Article Birds.

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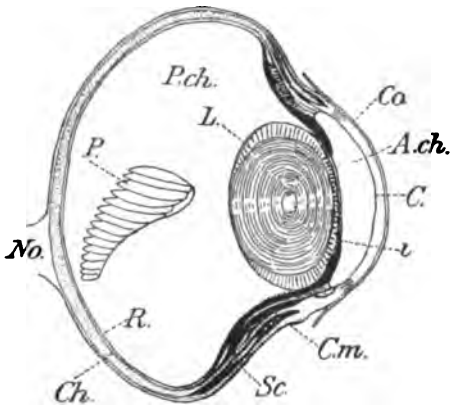
nism of this class is not in the larynx, but at the lower or pectoral end of the windpipe, in an organ called the syrinx, which consists of several stretched and vibratory membranes, tracheal rings and controlling muscles. This complicated organ, peculiar to birds, presents almost unlimited modifications, and is quite unlike the arrangement of laryngeal vocal cords in mammals, for the tongue has nothing to do with a bird's speech or music. (See Plate, Figs. 7, 8, 14.) For further consideration of the singing birds, see VOICE.

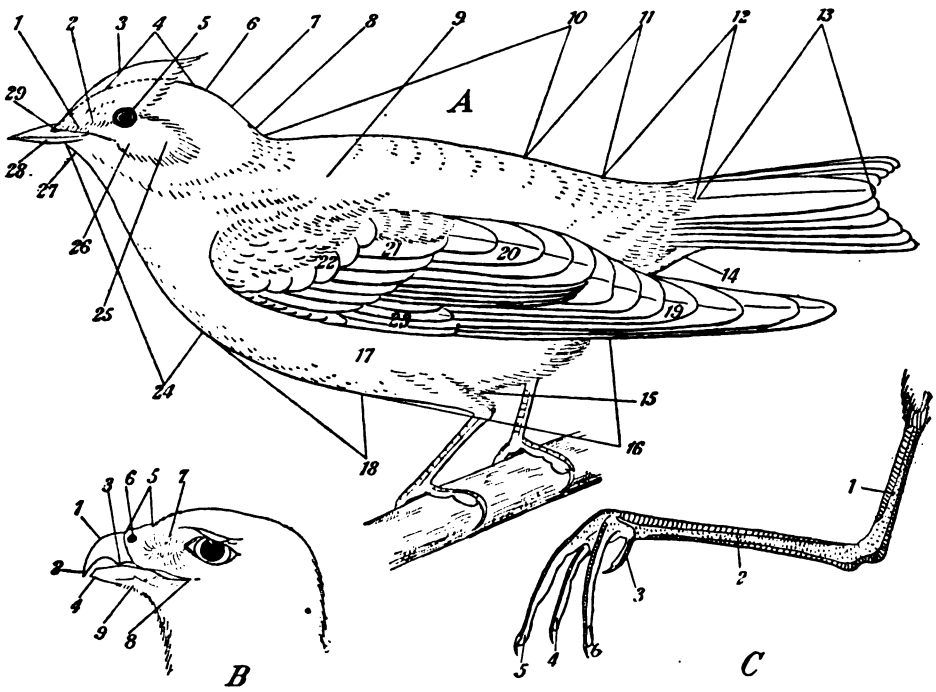
The Eyes of Birds are large, clear, highly perfected in structure, and, in many species, endowed with a power of vision which is beyond anything known elsewhere. The way in which vultures descend upon carrion from a height where they are invisible to us, or sea-birds swoop down upon fishes, or fly-catchers dart long distances upon insects so small we can barely perceive them at close range, are examples of their sharp-sightedness, with which is combined remarkable ability in rapidly changing the focus, as must be necessary to a bird darting swiftly upon prey it must keep constantly in view. There are no movable eyelids, but in place of them a nictitating membrane is frequently drawn over the eyeball to clean and lubricate it, or shield it from a glare. The owls and other nocturnal birds have great power of contractility not only in the pupil, but in the whole case of the eye. See EYE.



STRUCTURE OF THE EYE.

Horizontal Section: *A.ch*, Anterior chamber; *P.ch*, Posterior chamber; *C*, Cornea; *Ch*, Chorold; *Co*, Conjunctiva; *C.m*, Crampton's muscle; *i*, Iris; *L*, Lens; *P*, Pecten; *N.o*, Optic nerve; *R*, Retina; *Sc*, Sclerotic coat, with imbedded osseous ring.

A 'Sense' of Direction.—The so-called 'sixth sense' of orientation or direction, that is, the power of instinctively knowing and maintaining a course of flight through the air independent of



TOPOGRAPHY OF A BIRD.

A.—General Plumage: 1, forehead (frons); 2, lore; 3, crest; 4, crown (vertex); 5, eye; 6, hindhead (occiput); 7, nape (nucha); 8, hindneck (cervix); 9, interscapular region; 10, back proper (dorsum), including 11; 11, rump (uropygium); 12, lesser tail-coverts; 13, tail; 14, under tail-coverts (crissum); 15, leg (see C); 16, abdomen; 17, side of body; 18, breast (pectus); 19, primaries; 20, secondaries or cubitals; 21, tertiaries or greater coverts; 22, coverts; 23, alula, or bastard wing; 24, throat, the lower half of which is called 'jugulum'; 25, ear-coverts (auriculars); 26, cheek or malar region; 27, chin (mentum); 28, beak (see B); 29, nostril.

B.—Parts of the Beak and Face: 1, culmen (ridge of upper mandible); 2, apex, tip, or hook; 3, tooth on cutting edge of upper mandible; 4, junction (gonys) of rami of lower mandible; 5, cere; 6, nostril; 7, left lore; 8, corner of mouth (commissure); 9, chin (mentum).

C.—Parts of the Leg: 1, Thigh (tibiotarsus; 2, tarsus (metatarsus); 3, first or hind toe (hallux); 4, second or inner toe; 5, third or middle toe; 6, fourth or outer toe.

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guidance of landmarks, is manifested by birds in a most surprising way; for no other explanation (little as we understand it) seems to account for their ability to cross vast spaces of ocean straight toward small islands or restricted areas of coasts, as some birds habitually do in their migrations. See MIGRATION.

GENERAL CONSIDERATIONS. Many aspects of bird-life properly belonging to a treatise more extended than this need only be indicated here, because they are elsewhere discussed with reasonable fullness. Thus their classification is outlined under ORNITHOLOGY. The distribution of birds on the globe, where, in spite of their powers of flight, most groups and species are strictly bounded in their range, is sketched under DISTRIBUTION OF ANIMALS. The seasonal movements that characterize most birds outside the tropics, leading them to make more or less extended journeys, along the customary routes, northward in the spring and southward again in the fall, will be found explained under MIGRATION. The singing of birds, which forms so conspicuous and enjoyable a feature of their life, is discussed in the article VOICE, and their nest architecture, eggs, care of young, and domestic traits, are treated under NIDIFICATION; EGG; etc.; while their peculiar colors, ornaments, weapons, economic value, and habits in general, are portrayed in the biographies to be looked for under the names of various species and groups, and in such articles as AGRICULTURE; EVOLUTION; FALCONRY; FOWL; and the like. Birds have also taken a part in the history of mankind's mental and religious development, as appears in the articles AUGURIES; AUSPICE; and FOLKLORE. Finally, many species have been exterminated, directly or indirectly, since mankind came upon the earth, an account of which will be found under EXTINCT ANIMALS.

BIBLIOGRAPHY. *General Works.*—Newton, *A Dictionary of Birds* (London, 1896); Evans, *Cambridge National History:* Vol. IX., "Birds" (Cambridge, 1900); Stejneger, *Standard Natural History:* Vol. IV., "Birds" (Boston, 1885); Sharpe, *Royal Natural History:* Vols. III., IV., "Birds" (London, 1898); Huxley, "On the Classification of Birds" in *Proc. Zoöl. Soc. of London* (London, 1867; and ib., 1868, pp. 294-319); Nitsch and Burmeister, *System der Pterylographie* (Halle, 1840), translated into English by Dallas, and published by the Royal Society (London, 1867), as *Pterylography.* Fürbringer, *Untersuchungen zur Morphologie und Systematik der Vögel* (Amsterdam, 1888).

Faunal Works, North America.—Wilson, *American Ornithology* (Philadelphia, 1810-14); several more recent editions, of which a good one is Brewer's (Boston, 1853, reprinted, New York, 1853), and the finest is that issued by Porter & Coates (Philadelphia, 1871); Audubon, *Birds of America* (London, 1827-38); Swainson and Richardson, *Fauna Boreali Americana*, Part Second, Birds (London, 1831); Audubon, *Ornithological Biography* (Edinburgh, 1831-39); Nuttall, *Manual of the Ornithology of the United States and Canada* (Boston, 1832-34); DeKay, *Zoölogy of New York*, Part II., "Birds" (Albany, 1844); Baird, *Pacific Railroad Reports*, Vol. IX. (Washington, 1858), reprinted with an atlas of 100 plates by Baird and Cassin as *Birds of North America* (Philadelphia, 1860); Baird, Brewer and Ridgway, *History of North American Birds*, "Land Birds" (Boston, 1875); *Water Birds* (Cambridge, 1878); Chapman, *Bird Life* (New York, 1898, edition in colors); Coues, *Key to North American Birds* (Boston, 3d ed., 1887); Ridgway, *Manual of North American Birds* (Philadelphia, 1887); Chapman, *Handbook of Birds of Eastern North America* (New York, 1895). (The three last named are technically descriptive only.) Coues, *Birds of the Northwest* (Washington, 1874); Coues, *Birds of the Colorado Valley* (Washington, 1878; contains an extensive bibliography from 1612 to 1878); Cooper, *Ornithology of California* (San Francisco, 1870); Nelson, *Natural History Collections in Alaska* (Washington, 1887); Turner, *Contributions to the Natural History of Alaska* (Washington, 1886); Warren, *Birds of Pennsylvania* (Harrisburg, 1890); and many popular illustrated works.

Europe.—Temminck, *Manuel d'ornithologie* (Paris, 1815 and 1820); Brehm, *Naturgeschichte der Vögel Deutschlands, etc.* (Ilmenau, 1831); Gould, *Birds of Europe* (London, 1832-37); Naumann, *Naturgeschichte der Vögel Deutschlands*, new edition edited by Blasius (Leipzig, 1860); Fritsch, *Naturgeschichte der Vögel Europas* (Berlin, 1871); Dresser, *Birds of Europe* (London, 1879), 8 vols. quarto, "unquestionably the most complete work of its kind, both for fullness of information and beauty of illustration." For British birds in elaborately illustrated works, see Yarrell, *History of British Birds* (last edition, edited by Saunders, London, 1885); McGillivray, *History of British Birds* (London, 1837-40); Bree, *History of Birds of Europe* (London, 1875-76); Morris, *History of British Birds* (London, 1858); Seebohm, *History of British Birds and Their Eggs* (London, 1883-85); for a more condensed history, see Montagu, *Ornithological Dictionary*, Newman's edition (London, 1883).

Asia, Japan, and Oceania.—Pallas, *Zoögraphica Rosso-Asiatica* (Saint Petersburg, 1811); Gould, *Birds of Asia*, completed by Sharpe (London, 1883); David and Oustalet, *Les oiseaux de la Chine* (Paris, 1877); Taczanowsky, "Faune Ornithologique de la Siberie Orientale," in *Memoirs Acad. of Sciences* (Saint Petersburg, 1891); Blanford, *Zoölogy of Persia* (London, 1876); Seebohm, *Birds of Asia* (London, 1901); Jerdon, *Birds of India* (Calcutta, 1862); Blanford, *Fauna of British India: Birds* (London, 1893); Blythe, *Mammals and Birds of Burma* (London, 1875); Oates, *Birds of British Burmah* (London, 1883); Legge, *Birds of Ceylon* (London, 1880); Hume, *Nests and Eggs of Indian Birds* (Oates's edition, London, 1890); Blakiston and Preyer, *Birds of Japan* (London, 1882); Seebohm, *Birds of the Japanese Empire* (London, 1890); Gould, *Birds of Australia* (London, 1848, supplements, 1869)—magnificent folios of colored plates; Gould, *Handbook to the Birds of Australia* (London, 1865)—reprint, with additions, of the text of the foregoing; Buller, *Birds of New Zealand* (London, 1888); Wallace, *Malay Archipelago* (New York, 1869); Gould, *Birds of New Guinea*, completed by Sharpe (London, 1881); Hartlaub and Finsch, *Beitrag zur Fauna Centralpolynesiens* (Halle, 1867); Salvadori, *Ornitologia della Papaasia e delle Mollueche* (Turin, 1882; enlarged, 1891); Wilson and Evans, *Birds of the Sandwich Islands* (London, 1884).

For the Philippines, see Von Martens, *Journal für Ornithologie* (Leipzig, 1866); Lord Walden,

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Trans. Zoöl. Soc. of London (London, 1844); *Proc. Zoöl. Soc. London* (London, 1878 and 1879, many articles); Wardlaw-Ramsay, *Ibis* (London, 1884 and 1886); Blasius, *Trans. Linnæan Soc. of London*, and *Ibis* (London, 1884-88); and *Proc. Zoöl. Soc.* (London, 1888, and subsequently).

Africa.—Layard, *Birds of South Africa*, 2d ed. (London, 1884); Andersson, *Notes on the Birds of Damara-land* (London, 1872); Heuglin, *Ornithologie Nordostafrikas* (Cassel, 1875); Finsch and Hartlaub, *Vögel Ostafrikas* (Leipzig, 1870); Hartlaub, *System der Ornithologie West Africas* (Bremen, 1857); Shelley, *Handbook to the Birds of Egypt* (London, 1872); Tristram, *Fauna and Flora of Palestine* (London, 1884); Milne-Edwards and Grandidier, *Hist. nat. des oiseaux de Madagascar* (Paris, 1884).

South and Central America.—Azara, *Hist. nat. de los pájaros del Paraguay y Rio de la Plata* (Madrid, 1805); Belt, *A Naturalist in Nicaragua* (London, 1888); Bates, *The Naturalist on the Amazon* (London, 1863); Sclater and Salvin, *Biologia Centrali Americana*, Birds (London, (1880); Cory, *Birds of the West Indies* (Boston, 1889); Darwin, *A Naturalist's Voyage* (London, 1860); Sclater and Hudson, *Argentine Ornithology* (London, 1889). See also *Proceedings of the United States National Museum*, and those of the Zoölogical Society of London, since 1870.

BIRD, Fossil. Fossil remains that could be referred to birds were among the later acquisitions of paleontologists. The first were mistakenly so considered, and consisted of the famous 'bird-tracks' discovered in the 'brownstone' rocks of the Connecticut River by Hitchcock, about 1835, and extensively studied by him. These footprints may possibly, in a few instances, be traces of primitive animals properly called birds, but so far as known all are impressions made upon mud by dinosaurs and similar amphibians or reptiles of the Triassic Age. (See Dinosaur; Labyrinthodont, etc.). More recently true birds have been found fossil from the Jurassic Age onward, but their remains are everywhere comparatively scarce, due mainly to the easy destructibility of their bodies. The earliest to be identified proved to be also the earliest in time, and consisted of the remains in the Jurassic slates of Bavaria of Archæopteryx, whose characteristics are fully described under Archæopteryx. This seems to have been a true feather-clothed bird, with well-formed wings, but a long lizard-like tail, beset on each side with a row of horizontal quill-feathers, and a heron-like beak studded with teeth. These characteristics are so radically different from those of all other birds that the archæopteryx is classified in a subclass of itself termed Archæornithes; all other birds, fossil and recent, forming another subclass, Neornithes or Euornithes. A long gap in geological time separates the period of the archæopteryx from the next earliest fossil birds known, which belong to the upper, or more recent, part of the Cretaceous Age. These formations in Europe and India, but especially in the western United States, have yielded varied remains of large birds, which, because all have teeth in the beak, have been called Odontornithes or Odontolcæ. All are still of a low type of organization, showing many points of genetic affinity with reptiles, but far advanced beyond Archæopteryx; and all were aquatic and fish-eating. They approximate, indeed, so closely to the ordinary carinate birds of the present time that they are included with them in a single subclass, as above noted, of which, say Parker and Haswell, "they will constitute a separate series characterized by the possession of teeth and . . . that the two halves of the lower jaw remain completely separate in front, instead of having a solid bony union. Of these toothed birds the one type is known as *Ichthyornis*, and comprises somewhat gull-like birds characterized by having a numerous series of teeth implanted in distinct sockets, and also by the vertebræ or joints of the back articulating with one another by means of cup-like surfaces (instead of saddle-shaped). . . . It is quite within the bounds of possibility that these birds may be ancestral types of the modern gulls. With *Hesperornis* (q.v.) we are confronted with a totally different type, in which the teeth were implanted in an open groove, while the wings were rudimentary and the keel of the breast-bone was wanting, although the vertebræ resembled those of existing birds. In general organization, *Hesperornis*, indeed, approximated very closely to the modern divers. . . . That it was thoroughly aquatic in its habits is self-evident; while it may . . . be regarded as a specialized and flightless offshoot from the ancestral stock of the modern divers." The discovery and elucidation of these Cretaceous toothed birds was made chiefly by Prof. O. C. Marsh, of Yale University, between 1870 and 1880, and his novelties included a large number of skeletons or fragments which have been referred to various genera, and are preserved in the Yale Museum at New Haven. "They afford a most valuable contribution in favor of the doctrine of evolution, approximating more and more, as we descend in the geological scale, to reptiles, from which it may be confidently stated the avian class has originated."

With the closing of the Cretaceous Period, toothed birds seem to have disappeared, for bird-fossils from the early formation of Tertiary age lack them, and in general approach closely to modern types. Few of these fossils have been found in North America, but Europe and South America have supplied many genera and species of various groups, increasing in numbers as we rise in the geologic scale. Among the oldest (Eocene) were certain gigantic forms, characterized by long, powerful legs and small and apparently useless wings, but especially by "the enormous and ponderous sturcture of the skull, which is quite unlike that of any recent bird, and seems out of all proportion to the limbs, gigantic as are some of the leg-bones." These have been combined into a group (Stereornithes) including many species, chiefly of the genera Brontornis and Phororhacos, from the Miocene of Patagonia: "Brontornis, for example," according to Lucas, "had leg-bones larger than those of an ox: . . . while the great Phororhacos, one of his contemporaries, was not only nearly as large, but quite unique in build. Imagine a bird seven or eight feet in height, from the sole of his big, sharp-clawed feet to the top of his huge head, poise this head on a neck as thick as that of a horse, arm it with a beak as sharp as an ice-pick and almost as formidable, and you have a fair idea of this feathered giant of the ancient pampas." The skull equaled in size that of a large horse, but whether this great equipment

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was used for carnivorous purposes can only be conjectured. The general affinity of these huge birds seems to be with the herons; and with them have been classed Gastornis and certain other large forms of contemporary time in Europe and North America, whose habits are supposed to be those of cursorial birds of prey. Other birds of the early Tertiary Age represented the Steganopodes (q.v.), or were similar to gulls, penguins, cranes, kingfishers, game-birds, and many other modern types. The rocks and caves of the Paris Basin, and of central France, and the Eocene beds of Wyoming, have been particularly fruitful in ornitholites. The Miocene and Pliocene eras furnish still more fossil forms, among which a large number of genera still exist, showing how early birds arrived at the perfection of their form and adaptation. Lydekker tells us that by far the greater portion of the remains of birds from the still higher Pleistocene rocks seem to be generically if not specifically identical with those now inhabiting the district in which they occur, though their range at that time may have been different from its present extent. To this period, immediately precedent to that in which we live, belong such recently existing races as the moa, epiornis, dinornis, etc., but they are treated elsewhere.

Consult: Newton, *Dictionary of Birds* (London, 1893-96); *Oiseaux fossiles de la France* (Paris, 1867-71); Marsh, *Odontornithes, a Monograph of the Extinct Toothed Birds of North America* (Washington, 1880); Lucas, *Animals of the Past* (New York, 1901); Case, "The Development and Zoölogical Relations of the Vertebrates Aves-Mammalia," in *The Journal of Geology* (Chicago, 1898). See also for further references and particulars BIRDS; EXTINCT ANIMALS; ARCHÆOPTERYX; HESPERORNIS; MOA, etc.

BIRD, ARTHUR (1856—). An American musician, born in Cambridge, Mass. After studying in Berlin, he went to Canada, but in 1886 he became a resident of Berlin. His compositions comprise a Symphony; three suites for orchestra; a serenade for wind instruments; *Puppentänze*, and various other compositions for the piano; the comic opera *Daphne* (New York, 1897); and the ballet *Rübezahl*.

BIRD, EDWARD (1772-1819). An English artist. He was born at Wolverhampton, and was first apprenticed to a maker of japanware. At the expiration of his term he refused all offers to continue in the decoration of tea-trays and began to paint pictures. He aided himself by becoming a drawing-master in Bristol. His "Good News," sent to the Royal Academy in 1809, made him at once popular. Afterwards he received influential patronage, and in 1814 was appointed painter to Princess Charlotte. In 1815 he was elected a Royal Academician. His genre pictures are deemed the best of his work, though "The Field of Chevy Chase the Day After the Battle" is looked upon by some as a masterpiece. The "Surrender of Calais" is also a picture of importance. His style resembled that of Wilkie. He is best remembered by "The Blacksmith Shop," "The Village Politicians," "The Country Auction," and "The Young Recruit." He left uncompleted "The Embarkation of Louis XVIII. for France." He was buried with great honors in Bristol Cathedral.

BIRD, FREDERIC MAYER (1838—). An American clergyman, educator, and hymnologist, born in Philadelphia, Pa. He graduated at the University of Pennsylvania in 1857 and the Union Theological Seminary in 1860, and from 1860 to 1867 was a Lutheran minister. In 1868 he took orders in the Protestant Episcopal Church, and from 1870 to 1874 was rector at Spottswood, N. J. From 1881 to 1886 he was professor of psychology, Christian evidences, and rhetoric at Lehigh University, and from 1893 to 1898 was editor of *Lippincott's Magazine*. He edited *Charles Wesley Seen in His Finer and Less Familiar Poems* (1867); *The Lutheran Ministerium* (rev. ed., 1868; with Dr. B. M. Smucker); and *Songs of the Spirit* (1871; with Bishop Odenheimer), and has written much on hymnology, in which he is considered one of the foremost American authorities. He also published *The Story of Our Christianity* (1893).

BIRD, ISABELLA. See BISHOP, ISABELLA BIRD.

BIRD, ROBERT MONTGOMERY (1803-54). An American novelist. He was educated as a physician, but practiced little. Turning his attention to literature, he composed three tragedies, *The Gladiator*, *Oraloosa*, and *The Broker of Bogota*. The first suited the dramatic talent of Edwin Forrest and was one of his favorite impersonations. It still yields declamations for schoolboys. Bird's first novel, *Calavar*, appeared in 1834, and was followed by *The Infidel* (1835). Both of these were historical romances with Mexico as their scene and the Spanish Conquest as their background. Then followed *The Hawks of Hawk Hollow; Sheppard Lee;* and *Nick of the Woods* (1837). The last is his most popular and important work, the scene being laid in Kentucky near the close of the Revolutionary War, and its motive being the fear and hatred inspired in the backwoodsman by the red man. In other words, Bird sought to counteract the effects of Cooper's idealization of Indian character. Less important books—*Peter Pilgrim* (1838) and *Robin Day* (1839)—followed; then Bird practically retired from literary work, although he did some editing shortly before his death. His literary life was passed mainly in Philadelphia. He was a careful writer, and attained considerable popularity in his day.

BIRD-CAGE WALK. The name of a walk in Saint James's Park, London. There were, in the reign of the Stuarts, aviaries in that section, whence the name.

BIRD-CATCHING. See TRAPPING.

BIRD-CHERRY. A term applied in Great Britain and Europe to *Prunus padus*, a tree bearing its fruits in racemes, and in other respects being a close counterpart of the American choke-cherry (*Prunus Virginiana*). In America the term bird-cherry is reserved for *Prunus Pennsylvanica*, the wild red cherry, also known as pigeon or pin-cherry. Prunus Pennsylvanica is of little economic importance, being sparingly cultivated for ornamental purposes; it is occasionally used as a stock for the orchard cherry, and its fruit is used in making cough mixtures.

BIRDE, bērd, or **BYRD,** WILLIAM (1540-1623). An English ecclesiastical composer. He was educated at Edward VI.'s Chapel, was appointed organist in Lincoln Cathedral in 1563, and twelve years afterwards organist to Queen

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Elizabeth. He published numerous compositions exhibiting great musical learning, and contributed many pieces to Queen Elizabeth's *Virginal Book;* but his fame rests on the canon *Non nobis Domine,* which amid all changes in musical taste, has retained its popularity. His other works include *Psalmes, Sonets, and Songs of Sadnes and Pietie* (1588); *Songs of Sundrie Natures, etc.* (2d ed., 1610); *The Nadualia* (1607), and three masses.

BIRD IN A CAGE, THE. The title of a play by Shirley, licensed as *The Beauties.* The bird is the luckless Prynne, author of the *Histriomastix,* and the cage is the Tower of London.

BIRD ISLAND. One of the smaller of the Hawaiian Islands (q.v.).

BIRD-LICE, AND OTHER BIRD-PARASITES. See FLEA; LOUSE; MITE; TICK, etc.

BIRD-LIME. See TRAPPING.

BIRD OF PARADISE. A member of an Australasian family of passerine birds, remarkable for ornamental plumes, and so called in free translation of their native name in the Moluccas, meaning 'birds of the gods,' which Buffon transformed into *manucode.* They first became known to Europe by specimens brought by the returning ship of Magellan's expedition in 1522; but their skins had previously circulated in trade in India, Persia, and among the Arabs, being worn in the headdress of the Janizaries early in the Sixteenth Century; and they soon began to be imported into Spain and Portugal. In preparing for market the skins (mainly or altogether those of the great bird of paradise) the islanders cut off the legs and sometimes the wings, leaving in place of the latter simply the tufts of orange plumes that spring from beneath them. Thus, although Antonio Pigafetta, in his account of the Magellan voyages, had described them pretty accurately as living birds of ordinary structure, many fables were woven around these mutilated skins, and burdened literature for many years, as may be seen by a reference to Aldrovandus and his followers; and a monument remains in the present specific name of the most prominent form, *Paradisea apoda*—the 'footless.' It is a curious circumstance that although first, and for a long time, only known from the Moluccas (where the species sent by the ruler as a present to the King of Portugal was not rediscovered until lately), the paradise birds are most numerous and varied elsewhere, especially in New Guinea and the neighboring islands (particularly Aru) and along the northern margin of Australia; many, however, are confined to limited areas, as a single small island. There are about fifty species forming a part of a family (Paradiseidæ), which is closely related to the crows, and which also contains the Australian rifle-birds and bower-birds (q.v.).

Birds of paradise vary in size from that of a crow to that of a sparrow, and spend their lives and make their nests—which, as a rule, are of very simple construction—in the forest tree-tops. All of them are lively and active, running and hanging about the branches with the clinging agility of woodpeckers, as well as in graceful perching attitudes, and all are more or less gregarious and migratory, moving around, or passing back and forth between certain islands, with changing seasons in search of food. Their food consists largely of various fruits; but insects, snails, and other things are eaten, this group sharing the omnivorous appetites of the crows and jays. Females and young form little flocks which act together, but the males are less often seen, though betraying their presence by loud, harsh cries. The plumage of all is remarkably soft and velvety, and pleasing tints everywhere prevail; but there is a constant and great dissimilarity between the sexes, the females and young being dressed in quiet colors, and having none of the eccentric and gorgeous plumage which renders the males so conspicuous, and which, if worn by the hens, would betray their presence on the nest and lead to the extermination of the species by its natural enemies, such as monkeys, arboreal birds, and beasts of prey. The marvelous ornamentation of the males seems to have been developed wholly by rivalry in attracting the admiration of the females; and in the courting season assemblages of these magnificent beaus take place upon certain trees, where they display their beauties in a sort of matrimonial mart which the Papuans call dancing parties. "A dozen or twenty full-plumaged male birds," says Wallace, "assemble together, raise up their wings, stretch out their necks, and elevate their exquisite plumes, keeping them in a continual vibration. Between whiles they fly across from branch to branch in a state of great excitement, so that the whole tree is filled with waving plumes in every variety of attitude and motion."

This family, therefore, naturally plays a very important part in the evidence adduced by Darwin, Wallace, and other evolutionists, in support of the theory of sexual selection as a means of developing certain specific and group characteristics. It is at the time of these assemblages at dawn, when the birds are too much engrossed with their 'dancing' to be cautious, that the natives secrete themselves in the tree-tops and silently shoot them down with blunt-headed arrows; and this and other means have been practiced so assiduously to supply the demand for the plumes by milliners that several species are now nearly exterminated. The skins are roughly prepared and cured by smoke, so that they lose a good deal of their brilliancy and delicacy of texture. Few species have been caught alive, or, at any rate, have lived to be carried to Europe, and none probably have ever reached America. Some endure confinement well enough in the tropics, and exhibit in their cages an amusing solicitude to keep their trailing finery in perfect order.

It is impossible, in a brief article, to describe the bewildering variety and splendor of these astonishing birds, three of which are shown in the accompanying colored plate. The plumage of the males is characterized not only by great brightness, but by a glossy, velvety appearance, a metallic lustre, and a singularly beautiful play of colors. Tufts of feathers generally grow from the shoulders and these, in some of the kinds, are prolonged so as to cover wings; in the great emerald bird of paradise (*Paradisea apoda*), the prolongation of these shoulder-tufts is so great that they extend far beyond the body, and even far beyond the tail. They constitute the magnificent part of the well-known bird-of-paradise plumes, many of which, however, are derived from other related species, as *Paradisea minor,* illustrated in the plate; they can be erected so as to seem to fall in a shower over the whole

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bird. A peculiarity of many species is the presence of very long feathers, which consist almost wholly of the central shaft, with little or no vanes, and which curl and glisten like pliant wires. The twelve-wired *Seleucides nigricans* of New Guinea is a remarkable example of this; here they spring from the flanks, but they may be produced from the tail, wings, or head. The figure of the six-shafted bird of paradise (*Parotia sefilata*) in the plate is another example. Its plumes may be raised and lowered as the bird wills, and D'Albertis gives a long account of how one magnificently burnished male of this kind displayed all his glittering armature, one day, in a forest glade, for the delectation of admiring companions. Among the smallest of all is the third species illustrated, the king bird of paradise (*Cincinnurus regius*). It measures only about six and one-half inches in length, and the prevailing colors are velvety red, with the erectile, fan-like plumes on the sides purplish, tipped with green, and the under parts white, separated from the red throat by a green gorget. Those who wish to acquaint themselves further with these splendid birds, of which Thoreau said: "Nature made them pure feathers to show what she could do in that line," should examine the colored life-size plates in Elliott's *Monograph* of the family, and in Lesson's earlier monograph, entitled *Histoire naturelle des Oiseaux de Paradis et des Epimaques* (Paris, 1835); also the plates of the *Voyage of the Marchesa*, and the writings of A. R. Wallace, especially his *Malay Archipelago* (New York, 1869), of Dr. Guillemard, D'Albertis, Salvadori, Hunstein, and other European explorers of the Papuan Archipelago. A somewhat extended popular account will be found in the Royal Natural History, Vol. III., pp. 329-40, with several illustrations.

BIRD OF PASSAGE. See MIGRATION.

BIRD OF PREY. Any of the predacious, flesh-eating birds, called in the older classifications Rapaces, Raptores, Accipitres, etc., considered as a group from the point of view of habits rather than of structure. They have been regarded usually as an order divisible into two uncertain groups—Nocturnal and Diurnal—the former including the owls, and the latter the eagles, falcons, buzzard-hawks, vultures, etc. Ornithologically they are held by most modern systemists to include the three orders Striges (owls), Pandiones (ospreys), and Accipitres, the last embracing all the diurnal falconine and vulturine families, together with the aberrant form Gypogeranus. See SECRETARY-BIRD.

Characteristics.—Agreeing in subsisting by the chase and seizure of living animals, or upon dead flesh which must be torn apart, all of this large group present an organization which combines great power with special tools adapted to their habits. Most of them are masters of the power of flight, the great vultures soaring out of human sight, and the falcons having astonishing dash and quickness. Their wits are alert, and their senses are keen, their eyesight being the most highly developed, perhaps, in the whole animal kingdom. In size they vary from the condor, one of the greatest of all birds, to the finch-falcon or pigmy owl, scarcely larger than a sparrow. They are widespread, but far more numerous in warm climates than in cold, few dwelling near the Arctic zone; and while many are migratory, the most of them are permanent residents of the districts they inhabit. Their plumage, as a rule, is plain, black, white, reddish browns, and yellowish tints predominating; nor are crests or ornamental feathers common among them. The female is usually somewhat larger than the male—a fact due, no doubt, to the circumstance that she labors more continuously than her partner in providing food for her young and in defending her home. All the birds of prey are monogamous, and the larger ones are believed to pair for life. Certain nesting-sites are resorted to for many generations in succession by eagles, vultures, fish-hawks, etc., the nest being annually refitted for occupancy. The nesting-sites are very various, ranging from the ledge of a lofty crag, or a tall tree-top, to bushes, the ground, or even holes in the ground. The eggs of the owls are always white, but those of other families are usually blotched with color, and they are commonly few in number. "The period of incubation is longer than in most other aërial birds, and the young at first are covered with down, are quite helpless, and for an unusually long time are entirely dependent on the parents." In all species the many indigestible substances, as hair, scales, bones, etc., swallowed, are later ejected from the stomach in pellets called 'castings.'

Predaceous Equipment.—The birds of prey have acquired an equipment of beak and claws entirely suitable for their work. The beak is large, strong, terminates in a sharp hook, and the edges of the mandible are sharp and more or less serrated, forming an excellent piercing, tearing, and cutting instrument. The base of the upper mandible is sheathed in a membrane, bare of feathers, and often bright yellow in color, through which the nostrils open, and which is called the cere; no other birds have a similar beak except the parrots, which otherwise are very different from this group. In the vultures, not only the base of the beak, but the whole head is naked, in adaptation to their carrion-eating habits, involving the constant smearing of the head with filth prejudicial to feather-growth. (See VULTURE.) Instruments for seizing their prey (which includes fish), holding it or carrying it away, are provided in the feet, which are flexible, very strong, and armed with long, sharply pointed and powerful claws, giving a lacerating, catlike grasp, which ordinarily no force available to the victim is able to break. In carrion-feeders, however, the feet exhibit little of this power, and the talons are comparatively short and blunt, for they are not called upon to seize and hold a struggling victim. Most of these birds live many years. See illustrations under ACCIPITRES and BIRD.

BIBLIOGRAPHY. Consult: books mentioned under BIRDS; Fisher, *Hawks and Owls of the United States* (Department of Agriculture, Washington, 1893). See BUZZARD; EAGLE; FALCON; HAWK; OWL; VULTURE; with the accompanying plates; and the names of particular birds of prey.

BIRDS, THE. The title of a comedy by Aristophanes (q.v.).

BIRD'SALL, WILLIAM W. (1854—). An American educator, born at Richmond, Ind. He graduated at Earlham College (Richmond, Ind.), in 1873, and from 1885 to 1893 was instructor in mathematics at the Friends' Central School,

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BIRDS OF PARADISE

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1 PAPUAN BIRD OF PARADISE - PARADISEA MINOR 1/4 NATURAL SIZE
2 KING BIRD OF PARADISE - CINCINNURUS REGIUS 1/3 " "
3 SIX-SHAFTED BIRD OF PARADISE - PAROTIA SEFILATA 1/5 " "

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Philadelphia, Pa. In 1898 he was appointed president of Swarthmore College (Swarthmore, Pa.).

BIRDS'EYE LIME'STONE. A limestone at the base of the Trenton series in New York State, so called from the white 'eyes,' cross-sections of crystallized corals of the genus Tetradium, that appear on the surface of the stone. The rock is usually dove-colored, fine-grained limestone, which has in some cases, where free from the 'eyes,' been used for a secondary grade of lithographic stone. The maximum thickness of the formation is thirty feet, and it is exposed on the flanks of the Adirondack Mountains of New York, and has been doubtfully recognized in Kentucky. Its characteristic fossil in New York is Bathyurus extans, a trilobite. The name 'Birdseye Limestone' has been replaced by the geographic term 'Lowville Limestone,' which refers to the town of Lowville, N. Y., in the vicinity of which the formation is well developed. See ORDOVICIAN.

BIRD'S-FOOT (*Ornithopus*). A genus of plants of the natural order Leguminosæ, sub-order Papilionaceæ, deriving both its popular and its botanical name from the resemblance of the curved pods to birds' claws. The leaves are pinnate, with a terminal leaflet. One species, *Ornithopus perpusillus*, is a native of Great Britain, growing on dry, sandy, or gravelly soils—a small plant of little importance, the flowers of which are white, triated with red. *Ornithopus sativus* is an important forage plant. See SERRADELLA.

BIRD'S-FOOT CLOVER. See LOTUS.

BIRDS' NESTS. See NIDIFICATION.

BIRDS' NESTS, EDIBLE. See SWIFT.

BIRDS OF AMERICA, THE. A monumental work by John James Audubon (1827-30), published at a cost of $100,000 and sold at $1000 a copy.

BIRDS OF PASSAGE. Five collections of poems, or 'Flights,' by H. W. Longfellow (1863-1878).

BIRD-SPIDER, or BIRD-CATCHING SPIDER. A name given to some of the largest spiders, belonging to the family Theraphosidæ. Most of them are natives of tropical and subtropical America. The best known is *Mygale* or *Avicularia avicularia* of Brazil, known there as *aranha caranjuejira*, or 'crab-spider.' It is nearly two inches long, very hairy, and almost entirely black; its feet, when stretched out, occupy a surface of nearly a foot in diameter. The hooks of its mandibles are strong, conical, and very black. This great spider forms a tube-shaped burrow in sandy soil, widening toward the mouth, sometimes 18 inches deep, and lined with a fine white semi-transparent silken tissue, like muslin, at the bottom of which the silken nidus of eggs is loosely placed. Here the females sit peering out of the trumpet-shaped entrance most of the time, day and night. They are timid, gentle in disposition, and do not bite their captors. No débris is ever found about their burrows to indicate their food. In fact, their prey is not known, nor their manner of taking it, which apparently is never by searching for it or chasing. "We must confess," says the eminent specialist, the Rev. F. O. P. Cambridge (*Proc. Zoöl. Soc. of London*, 1896, p. 717), "that we do not know the staple diet. . . . Though I was out night after night, and though I watched, on several occasions, the whole night through, the tunnels of twenty and upward of the sand-burrowing 'mygale,' yet not *once* could I detect a spider in the act of seizing her prey or even venturing beyond the entrance of her burrow."

BIRD-TICK. See FOREST-FLY.

BIRD'WOOD, Sir GEORGE CHRISTOPHER MOLESWORTH (1832—). An English physician and botanist, born in Belgaum, Bombay. He studied at the University of Edinburgh, and was in 1854 appointed to the medical staff of the Bombay Establishment of the East India Company. From 1857 to 1869 he was connected with the Grant Medical College of Bombay as professor successively of anatomy and physiology, and botany and materia medica. He was also chiefly instrumental in establishing in Bombay the Victoria and Albert Museum and the Victoria Gardens. In 1871-99 he was special assistant in the revenue, statistics, and commerce department of the India Office. He was a learned student of Indian botany. He published in 1862 a *Catalogue of the Economic Vegetable Products of the Bombay Presidency* (1868), and identified the frankincense-tree (*Transactions of the Linnæan Society*, Vol. XXVII.). His other works include: *The Industrial Arts of India* (1888); *The Aryan Flora and Fauna* (in Max Müller's *Biography of Words*, 1888); *Report on the Cultivation of Spanish Chestnuts* (1892); and *The First Letter-Book of the* (*English*) *East India Company* (1895).

BIREJIK, bē'rā-jēk', or **BIR,** bēr (anciently, *Birtha*, fortress, stronghold). A town of Asiatic Turkey, in the Vilayet of Aleppo, on the east bank of the Euphrates, at the head of navigation (Map: Turkey in Asia, H 4). The town is surrounded by a strong wall flanked with towers; its streets are narrow but clean; it has several mosques with tall minarets, a caravansary, a bazar, and a ruined citadel and castle. Travelers and caravans from Aleppo to Diarbekr, Bagdad, Persia, etc., cross the Euphrates at this point. Population (estimated), 8000. Bir, which signifies 'well,' is the prefix of several smaller towns in Arabia.

BIRET'TA. See COSTUME, ECCLESIASTICAL.

BIRGE, bīrj, EDWARD ASAHEL (1851—). An American naturalist. He was born in Troy, N. Y., and was educated at Williams College and at Harvard University. He was appointed professor of natural history and zoölogy at the University of Wisconsin in 1879; dean of the College of Letters and Science in 1891, and was acting president of the university from 1900 to 1901. In 1894 he became director of the Geological and Natural History Survey of Wisconsin. He has written numerous papers on zoölogy, and has edited the revision of Prof. James Orton's *Comparative Zoölogy* (1882).

BIRGE, HENRY WARNER (1825-88). An American soldier, born in Hartford, Conn. At the opening of the Civil War he organized the first State regiment of three-years troops—the Fourth Connecticut Volunteers — in which he was appointed major. After service in Maryland and Virginia, he was commissioned colonel of the Thirteenth Connecticut infantry regiment in 1861, and in 1862 was placed in command of the

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defenses of New Orleans. In December of the latter year he was appointed to the command of a brigade, which he retained through the first Red River campaign and at the siege of Port Hudson. He was raised to the rank of brigadier-general in September, 1863, served in the second Red River expedition, and subsequently commanded at Baton Rouge. In 1864 he was assigned to the command of the second division of the Nineteenth Corps. He participated in the battles of General Sheridan's campaign in the Shenandoah Valley, and in February and March, 1865, was appointed to the command of the defenses of Savannah. In the same year he resigned, with rank of brevet major-general of volunteers.

BIRGER DE BIELBO, bēr'gĕr dâ byĕl'bô (?-1266). Regent of Sweden (1250-66), during the minority of his son, Waldemar, the successor of Eric XI. During his regency he passed many beneficent laws; brought over to Christianity the inhabitants of Tavastehus, Finland, whose incursions had frequently desolated Sweden; increased the Swedish possessions in Finland; founded the city of Stockholm; and established important commercial relations with Lübeck and Hamburg.

BIR'GIT, BIRGIT'TA. See BRIDGET.

BIRGIT'TINES. See BRIGITTINES.

BIRKBECK, bĕrk'bĕk, GEORGE (1776-1841). An English physician and educational reformer, born at Settle, Yorkshire. He studied medicine at the universities of Edinburgh and London. At the age of 23 he was appointed professor of philosophy at the Andersonian University, Glasgow, where in 1800 he introduced a course of lectures to workingmen. This 'mechanics' class' evolved, in 1823, into the Glasgow Mechanics' Institution, which is believed to have been the first institution of its kind. This was followed in 1824 by the London Mechanics' Institution, also organized by Dr. Birkbeck, and subsequently named in his honor. The success of these educational establishments paved the way for the present system of popular scientific education in England.

BIRKDALE, bĕrk'dâl. A manufacturing town and railway junction in Lancashire, England, 1½ miles southwest of Southport. Population, in 1891, 12,400; in 1901, 14,200.

BIRKENFELD, bĕr'ken-fĕlt (Ger. *Birke*, birch + *Feld*, field; refers to its rich forests). A German principality belonging politically to the Duchy of Oldenburg, but forming an enclave in the Prussian Rheinland adjoining the districts of Coblenz and Treves (Map: Germany, B 4). Its area is about 192 square miles. The principality belongs to the region of the Hochwald and Idar Wald, and its surface is hilly and covered for a large part with forests. The area devoted to agriculture is very limited, and the domestic supply of agricultural products generally falls short of the demand. The chief industry is the polishing of agates, which gives work to about 8000 men. The administration of the principality is vested in a board, consisting of a president and two assistants, responsible to the ministry of Oldenburg, and a council of fifteen members. The population was 42,248 in 1895 and 43,320 in 1900. About 80 per cent. of the population is Protestant. The capital, Birkenfeld, had a population of 2229 in 1900.

BIRKENHEAD, bĕrk'en-hĕd. A seaport town and Parliamentary borough in Cheshire, England; situated opposite Liverpool, on the left bank of the Mersey (Map: England, C 3). It includes the townships of Claughton, Oxton, Tranmere, and part of Higher Bebington. The growth of the town has been very rapid since the opening of its first great dock in 1847; its floating and dry docks now cover an area of over 165 acres. They are, with those of Liverpool, under the management of the Mersey Docks and Harbor Board. (See LIVERPOOL.) The streets of the town are regularly laid out, and the buildings, as a rule, substantial. Among the notable buildings are the handsome town-hall, the merchants' hall, and the market-hall. The educational institutions include Saint Aidan's Theological College, a school of science and art, and a public library. Birkenhead has for some years been celebrated for its extensive ship-building yards, some of the largest iron ships afloat having been built there. The notorious Confederate cruiser *Alabama* was built by the Messrs. Laird, to whose enterprise, more than that of any other firm, the town owes its present importance. In the neighborhood of the docks are the Canada works for the construction of gigantic bridges; the Britannia machinery-works, and others. Birkenhead has a number of street railway lines, which are owned by the corporation, but leased to private companies. Birkenhead is connected with Liverpool by a ferry once owned by the Priory of Birkenhead, now by the town, and by the Mersey Tunnel, opened in 1886. Birkenhead was incorporated in 1877 and sends one member to Parliament. The town's affairs are administered by a mayor, a municipal council of forty-two and a board of aldermen of thirteen members. (See GREAT BRITAIN, paragraph on *Local Government*.) The town owns its water-works, which net an annual profit of about $26,000. It also owns its gas-works and an electric-light plant, the former netting annually about $73,000, the latter involving a slight deficit. Refuse is for the most part burned in destructors; the sewage is discharged into the sea. The town maintains public baths, markets, a slaughter-house, and a cemetery. There are three fine municipal parks. Population, in 1891, 99,857; in 1901, 110,926.

BIRMAH, bĕr'mâ. See BURMA.

BIRMINGHAM, bĕr'mĭng-am (either AS. *Bermaring*, *Beorming*, a proper name + *hām*, home; or 'home on the hill by the heath,' from AS. *brōm*, broom + *wych*, descent + *hām*, home). The chief seat of the British for metallic manufactures, and the leading hardware centre of the world (Map: England, E 4). It stands near the centre of England, in the northwest of Warwickshire, with suburbs extending into Staffordshire and Worcestershire, 112 miles northwest of London. It has the status of a city, a civic county, and a Parliamentary and municipal borough. It is built on the eastern slopes of three hills at the confluence of the Rea and the Tame, with a gravelly foundation overlying clay and new red sandstone, and is one of the best-drained towns in England. The older part of the city is crowded with workshops and warehouses; but the modern portion is well built, and possessed of architectural beauty. Among the finer build-

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ings are the post-office, the corporation buildings, the town-hall, the exchange, the rooms of the Royal Society of Artists, the borough jail, and the splendid Central Railway Station, covering 12¾ acres. The chief ecclesiastical edifices are the Anglican churches of Saint Martin and Saint Chad, and the Baptist Wyclif Chapel of Saint Chad, and the Baptist Wyclif Chapel of Fourteenth-Century Gothic. The central part of Birmingham, the worst overcrowded section before 1876, has been vastly improved since then, and has become the best part of the city. This was accomplished by the municipality condemning the district and purchasing it for some $8,000,000. A considerable income is derived from the leases, and in 1951 the city will come into possession of all the buildings erected on its land. Besides nine parks, of which the chief are Aston Park on the northeast, Cannon Hill Park on the south, and Botanical Gardens, seven gardens and recreation-grounds are distributed over the city.

Birmingham has been at the head of the large progressive cities of England in the work of modernizing its institutions. In 1875 it reorganized its health department, which set itself to work eradicating insanitary conditions. One of the first tasks was the providing of a pure water-supply. Some 3000 polluted wells were closed, to prevent the spreading of zymotic diseases. That, combined with the condemnation of insanitary houses, the increase of disinfecting facilities, and a rigorous inspection of food-supplies, helped to reduce the average death-rate from 26 per 1000 to less than 20. In the insanitary districts the reduction was from 60 and more per 1000 to 25.

With the same purpose in view the city improved its sewage system by providing a modern system of sewage and garbage collection combined with a sewage-farm; it erected baths and wash-houses, hospitals, asylums, special artisans' dwellings, etc. Most of Birmingham's municipal undertakings date back to 1874-75, when Mr. Joseph Chamberlain, as mayor of the town, inaugurated the new era. At that time, also, Birmingham bought out the water company at a cost of more than $6,000,000. Since then great extensions and improvements have been carried out, and a new supply obtained from Mid-Wales, 80 miles from the city, for which more than $30,000,000 was appropriated. The gas-works were acquired by the city in 1875 for $10,000,000. The price of gas was reduced about 33 per cent., which did not prevent the city from getting a net income of more than $150,000, after allowing for interest charges and sinking-fund payments. In 1899 the supply of electricity was also municipalized. Free libraries in Birmingham date back to 1860. They consist of a Reference Library, Central Circulating Library, and nine branch libraries. The city owns the markets and slaughter-houses, which yield a considerable net income, in addition to facilitating the inspection of the food-supply of the city. It also owns its street railways, which are operated by private companies, paying a high rental to the city.

As an industrial centre, especially one in which production on a small scale is carried on to a considerable extent, Birmingham is taking great pains to provide all the facilities for technical education that can be obtained. In 1896 a municipal technical school was erected at a cost of nearly $500,000. The school is attended by nearly 3000 pupils, who are charged a small fee for tuition. In addition to that, the Midland Institute and Mason College provide similar facilities. The well-known Queen's College is connected with the London University. The city maintains also a school of art, with branches in several of the board schools. The art gallery and museum, also maintained by the municipality, form an integral part of the art school. The elementary schools are under the control of the school board. The charitable institutions, maintained by endowments, legacies, and donations, comprise the General and Queen's hospitals, children's hospital, general dispensary, asylums for lunatics, for the blind, deaf and dumb, sanatorium, and almshouses.

Birmingham is the largest manufacturing town in England after Manchester. It became very early the seat of iron manufactures on account of its proximity to a forest and extensive iron-mines. Its principal industry at present is the manufacture of iron and steel products. Its manufactures comprise steam and gas engines, electric motors, hydraulic presses, railway cars, guns, machinery. In addition there are glass-works, chemical-works, breweries, etc. Female workers are generally employed in the lighter trades.

Birmingham returns seven members to Parliament. (For the government of Birmingham see ENGLAND, under *Local Government.*) It is the seat of an American consulate, and the see of a Roman Catholic bishop. Like most of the great industrial cities, Birmingham increased rapidly in population during the Nineteenth Century. In 1801 it had 60,000 inhabitants; in 1901, 522,200; an increase of 770 per cent. in a century, and of 21.5 per cent. in the last decade (1891, 430,000).

HISTORY. Birmingham was an old town of the Anglo-Saxons (Beormings Ham). After the Conquest, it was ruled by the De Birmingham family till 1527. In mediæval times it was a thriving commercial and industrial place. During the Civil War it was stanchly Puritan, and supplied the armies of Parliament with arms. Prince Rupert burned it in 1643. Its great commercial importance dates from the Seventeenth Century, when the restoration of Charles II. brought from France a fashionable rage for metal ornaments, and Birmingham supplied the demand with unexampled vigor. In the latter part of the Seventeenth Century the Birmingham smiths began to manufacture swords and guns. Its hardware manufactories as early as 1727 are said to have supported 50,000 persons. The earliest attempts at cotton-spinning by rollers were made in 1736. The opening of the coal and iron fields of Lancashire added greatly to its prosperity, so that in 1745 it was one of the principal inland towns of England. By 1761 its manufactures were known throughout the world. Toward the end of the Eighteenth Century it was a centre of Liberal agitation, being the home of Dr. Priestley. The Reform and Chartist movements had powerful support in the town.

BIBLIOGRAPHY. Bunce, *History of the Corporation of Birmingham, with a Sketch of the Earlier Government of the Town* (Birmingham, 1885); Foster, *How We Die in Large Towns;* a lecture on the comparative mortality of Birmingham and other large towns (London, 1875); Griffith, *History of the Free Schools, Colleges, Hospitals, and Asylums of Birmingham* (London,

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1861); Timmins, *The Resources, Products, and Industrial History of Birmingham and the Midland Hardware District* (London, 1866); Shaw, *Municipal Government in Great Britain* (New York, 1895).

BIRMINGHAM. A city and the county-seat of Jefferson County, Ala., and an important manufacturing centre, 97 miles northwest of Montgomery; on the Central Railroad of Georgia, the Louisville and Nashville, the Southern, the Alabama Great Southern, and the Kansas City, Memphis and Birmingham railroads (Map: Alabama, C 2). Birmingham was laid out in June, 1871, by the Elyton Land Company, and in the following December, with a population of less than 1000, it was chartered as a city. It did not progress rapidly until the end of 1880, when the great natural resources of the vicinity began to be developed, and, owing to its situation in a region rich in iron, coal, and limestone, it has become one of the most important and prosperous cities in the South. The chief industry is the manufacture of iron and steel in various forms. Besides pig-iron furnaces, foundries, engine and boiler works, machine-shops, and car-wheel works, it has cotton-factories, packing-houses, cottonseed-oil mills, and extensive iron and coal mining and lumber interests. Birmingham has three parks of great beauty—Capitol, East Lake, and Lakeview parks—an opera-house, and several fine buildings, prominent among which are the Jefferson Theatre, the Jefferson County courthouse, the Union passenger-station, 600 feet long and 200 feet wide, and Saint Vincent Hospital, completed in 1900, at a cost of $250,000. About five miles northeast of the city, at East Lake, is Howard College (Baptist), organized in 1841. Birmingham is governed under a charter of 1898-99, which provides for a mayor, elected biennially, and a city council, which confirms the mayor's nominations to the board of education. The police commission, of seven members, is elected on the general ticket with other officials. The city expends about $300,000 yearly, the main items being: Police department, $35,000; fire department, $45,000; and schools, $30,000, exclusive of $20,000 devoted by the State and county. Population, in 1880, 3086; in 1890, 26,178; in 1900, 38,415.

BIRMINGHAM FESTIVAL, The. A periodical musical festival begun in Birmingham, England, in 1768, and given every three years. At one time the programme was made up largely from Handel, and at all times the character of the music has been of the highest order. The custom is in a measure a commemoration of the founding of Dr. Ash's hospital in the town in 1766, and the proceeds are given to the perpetuation of this institution.

BIRNAM, bēr'nam. A hill 1324 feet high, in the east of Perthshire, Scotland, near Dunkeld, 12 miles northwest of Perth, commanding a fine view of the valley of the Tay (Map: Scotland, E 3). It was formerly covered by part of an ancient royal forest, which Shakespeare has immortalized in his tragedy of *Macbeth*.

BIRNBAUMER WALD, bērn'bou-mēr vält (Ger. *Birnbaum*, pear-tree + *Wald*, wood, forest; a translation of the Latin *ad pirum*, at the pear-tree.) A highland of Carniola, near the river Frigidus, northeast of Triest. Theodosius won a victory over Arbogast and Eugenius there in 394.

BIRNEY, bēr'nĭ, David Bell (1825-64). An American soldier, the son of James G. Birney. He was born in Huntsville, Ala., graduated at Andover, studied law in Cincinnati, and practiced for several years in Philadelphia. He entered the Federal Army as lieutenant-colonel in the Twenty-third Pennsylvania Infantry, in April, 1861; was raised to the rank of brigadier-general of volunteers in February, 1862; served with great gallantry in the Peninsular campaign, distinguishing himself particularly at Yorktown and Williamsburg, and afterwards took a conspicuous part in the second battle of Bull Run, and in the battles of Fredericksburg and Chancellorsville. In May, 1863, he became a major-general of volunteers, and during part of the battle of Gettysburg commanded the Third Army Corps. From May to June, 1864, he commanded a division under Hancock, and rendered efficient services in the battles of the Wilderness and Spottsylvania; and after July of this year he was in command of the Tenth Corps of the Army of the James. He died on October 18, 1864, in Philadelphia, of a fever contracted during this last campaign. Consult Vol. IV. of the *United Service Magazine* (New York, 1865).

BIRNEY, James Gillespie (1792-1857). An American reformer, leader of the conservative Abolitionists during the anti-slavery struggle. He was born in Danville, Ky., studied at Transylvania University, and graduated at Princeton in 1810. He then studied law under Alexander J. Dallas in Philadelphia, began practice in Danville in 1814, and was elected to the State Legislature two years later. In 1818 he removed to a plantation in the vicinity of Huntsville, Ala., and in the following year served in the Alabama Legislature. He resumed his law practice in Huntsville in 1823, was elected prosecuting attorney there, and soon became the most successful practitioner in northern Alabama, but turned his attention more and more to the study of the slavery question, and in 1832-33 acted as agent of the Colonization Society (q.v.) for the district embracing Tennessee, Alabama, Mississippi, Louisiana, and Arkansas. In November, 1833, he returned to Danville, Ky., where he freed his own slaves, and devoted himself with zeal and energy to the cause of gradual emancipation, though he soon became a convert to immediatism. He organized the Kentucky Anti-Slavery Society in 1835, and in the same year planned an anti-slavery paper; but, as he was unable to find a publisher in Kentucky, he removed to Cincinnati, Ohio, where, on January 1, 1836, he issued the first number of *The Philanthropist*. During the next few years his press was several times destroyed by mobs, and he himself was repeatedly threatened with personal violence and death; but in spite of opposition his paper rapidly attained a wide circulation and exerted a powerful influence among those who, like himself, believed in abolition, but opposed the radicalism of Garrison and his followers. (See Garrison, William Lloyd.) Both as an editor and as a speaker, though firm and unflinching in his advocacy of what he believed to be right, he upheld the Constitution, opposed all violence and fanaticism, and was uniformly courteous, tolerant, and fair. He spent much of his time in

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making speeches throughout the North, especially before the legislatures of the various States, and in 1837 was elected secretary of the American Anti-Slavery Society. In this capacity he conducted the correspondence of the Society, employed its lecturers, and prepared its reports; and, in addition, he continued to make frequent addresses before legislatures and large public assemblies. He soon came to be regarded everywhere as the leader of the 'Constitutional' Abolitionists; that is, of the Abolitionists who opposed all revolutionary measures, fought against secession, and endeavored to effect their desired reforms through the ordinary machinery of government; and both in 1840 and in 1844 he was the unanimous candidate of the Liberty Party (q.v.) for the Presidency, receiving 7069 votes in the first election and 62,263 in the second. He was disabled by a fall from his horse in 1845, and passed the last twelve years of his life in retirement as an invalid, first in Bay City, Mich., and afterwards in Eagleswood, N. J. Besides numerous brief articles for the press, his chief writings were his *Letter on Colonization* (1834); *American Churches the Bulwarks of American Slavery* (1840); *Speeches in England* (1840); and *Examination of the Decision of the United States Supreme Court in the Case of Strader et al. vs. Graham* (1850). Consult the excellent biography by his son, William Birney, *James G. Birney and His Times* (New York, 1890).

BIRNEY, William (1819—). An American soldier and lawyer, the son of James G. Birney. He was born near Huntsville, Ala.; was educated at Yale College and in Europe; took an active part in the Revolution of 1848 in France, and for two years was professor of English literature in the college at Bourges. He entered the Federal Army at the outbreak of the Civil War, was elected captain; attained the rank of brigadier-general of volunteers in May, 1863, and from then until the close of the war was in command of a division. In 1863-64 he served as one of the three superintendents charged with the enlistment of colored troops, and in this capacity organized seven regiments. He served with conspicuous gallantry in the battles of Second Bull Run, Chantilly, Fredericksburg, and Chancellorsville: received the brevet rank of major-general of volunteers in March, 1865, "for gallant and meritorious services during the war," and resigned in August of the same year. After the war he lived for a time in Florida, but in 1874 removed to Washington and became a practicing attorney. Among his publications are the excellent *Life and Times of James G. Birney* (1890) and *A Plea for Intellectual and Spiritual Liberty.*

BIRON, *Fr. pron.* bê'rôn'. (1) A light-headed, light-tongued lord in the suite of the King of Navarre, in Shakespeare's *Love's Labor's Lost.* (2) A character in the tragedy *The Fatal Marriage,* by Southerne; the husband of Isabella, and much-wronged brother of Carlos. The rôle was among the earliest of the younger Macready.

BIRON, Conspiracy and Tragedy of Charles, Duke of. The name of two tragedies, really two parts of a single theme, founded on the career of the French conspirator of the title. Performed in London in 1605 and 1608, they were prohibited at the instance of the French Ambassador, and three actors were arrested.

BIRON, bê'rôn', Armand de Gontault (1524-92). A French soldier. He became grand master of artillery in 1569, and was in command at the siege of Rochelle, and in Guienne. After the assassination of Henry III., who had appointed him marshal in 1577, he was among the first to declare for Henry IV. He brought a part of Normandy under subjection, and dissuaded Henry from going into England; distinguished himself in the battles of Arques and Ivry against the League, and was killed by a cannon-shot at the siege of Epernay.

BIRON, Charles de Gontault, Duke de (1562-1602). A French soldier, son of Armand, under whose command he served with distinction in the campaigns against the League, acquiring renown and the surname of 'Fulmen Galliæ,' or 'Thunderbolt of France.' He was made admiral of France by Henry IV. in 1592, and marshal in 1594; became governor of Burgundy in 1595, and was created duke and peer of France in 1598. He was a man of great intrepidity, but was fickle and treacherous. He was sent to England in 1601 to announce the marriage of Henry with Maria de' Medici, but about the same time he was condemned by the Parliament for treasonable negotiations with Spain and Savoy, aiming at the overthrow of the Bourbon dynasty, the dismemberment of the kingdom into provincial States, and his own elevation to the sovereignty of Burgundy. Induced to come to Paris, he was apprehended and beheaded in the Bastille.

BIRON, bê'rôn, Ernest John, Duke of Courland (1690-1772). A Russian statesman. He was the son of a landed proprietor of the name of Bühren. Through Bestuzheff-Ryumin, who befriended him, he obtained the favor of Anna Ivanovna, who was called to the Russian throne in 1730. The Council of the Empire attempted to secure from her an aristocratic constitution, but she crushed remorselessly the powerful nobility, notably the Dolgorukis and the Galitsins, and made her lover, Biron, who had adopted this French name in place of that of Bühren, her chamberlain and practical ruler of the Empire. Rambaud describes him "as a large, handsome man, uneducated, loving only his horses; a superb lackey, morally as evil and vindictive as his mistress." His enemies and rivals were swept out of the way, while the poor people were ground down by taxation. The Russians have described this reign as the *Bironovachina* and the 'German yoke.' He is said to have caused over a thousand executions, while the number of persons exiled by him to Siberia is estimated at from twenty to forty thousand. His revengeful severity is said to have exceeded that of his unscrupulous mistress. As an administrator, however, he showed considerable ability, and maintained order in the Empire. The Duchy of Couron, in which Biron was born, was then in dispute between Poland and Russia. Anna conferred the duchy upon Biron, and Russian armies were employed to place on the Polish throne Augustus III., Elector of Saxony, who had promised the investiture of Courland for Biron. The Emperor Charles VI., subordinating everything to his Pragmatic Sanction, readily countenanced these violent acts, and the King of Prussia was bought by certain territorial concessions. In 1737, therefore, the nobles of Courland were obliged to

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confirm Anna's appointment, and in 1739 the investiture took place at Warsaw by authority of the Polish King and Senate. The Empress died in October, 1740, and Biron, under her will, assumed the regency in the name of the infant Emperor Ivan VI. Field-Marshal Münnich, who during the past reign had supported Biron, but who saw that he was to receive slight recognition now, set on foot a conspiracy, the result of which was the exile of Biron to Pelim, in Siberia. A second palace revolution occurred soon after, and the new Empress, Elizabeth Petrovna, banished Münnich and permitted Biron to take up his residence at Yaroslav. After Elizabeth's death, his duchy was restored to him by Catharine II. He died September 28, 1772.

Consult: Ruehl, *Geschichte E. J. von Birons* (1764); Rambaud, *Russia*, Vol. II.; Lavisse et Rambaud, *Histoire générale* (Paris, 1893-1901); "Lettres d'Anna Ivanovna," in *L'archive Russe*, Vols. II. and III. (Moscow, 1873-77) and *Les antiquités russes* (Moscow, 1884); Halem, *Lebensbeschreibung des russischen General-Feldmarschalls Münnich* (Oldenburg, 1803).

BIRR, bĕr. See PARSONSTOWN.

BIR'RELL, AUGUSTINE (1850—). An English chancery barrister, best known as an essayist, born at Wavertree (near Liverpool). He graduated in 1872 at Trinity Hall, Cambridge, and in 1875 was admitted to the bar of the Inner Temple. In 1889, 1892, and 1895 he was returned to Parliament as a Liberal for West Fife, and in 1896 was appointed professor of law in University College, London. By his first volume, *Obiter Dicta* (1884), he achieved forthwith a unique place among modern English essayists. His power of analysis, his wit—often epigrammatic—his positive opinions, and his urbanity, combine to form a style whose easy art has evoked the word 'birrelling.' He is also known as an interesting occasional lecturer on literary subjects. His publications include, further: *Obiter Dicta, Second Series* (1887); a *Life of Charlotte Brontë* (1887 in Great Writers Series); *Men, Women, and Books* (1894); *Lectures on the Duties and Liabilities of Trustees* (1896); an edition (1897) of Boswell's *Life of Johnson; Sir Frank Lockwood* (1898); and *Seven Lectures on the Law and History of Copyright in Books* (1899), and *Collected Essays* (1900).

BIRT, bĕrt, THEODOR (1852—). A German classical philologist. He was born in Hamburg, March 22, 1852, became professor at Marburg, and is author of numerous monographs of a philological and historical character, among which is *Das antike Buchwesen in seinen Verhältnissen zur Litteratur* (1882).

BIRTH (AS. *beorf, gebyrd*, from *beran*, to bear; cf. Ger. *Geburt*, birth). At law birth does not take place until the complete separation of the child from its mother and the setting up of its independent system of circulation. The old notion that the child must be heard to cry in order to gain the status of a living person was never a part of the common law. Even before birth a child is for many purposes regarded as a living person, and may, accordingly, inherit real property or acquire a *vested* interest under a will or grant of lands. The latter result has been secured by statute in England, and generally in the United States. (See POSTHUMOUS CHILD.) At common law the killing of an unborn child was not murder, but it has been made so, generally of the grade of manslaughter, by modern statutes. See ABORTION.

In England and many of our States there are elaborate provisions by statute for the compulsory public registration of births. These provisions apply to all children born alive, whether legitimate or illegitimate, but not to such as are stillborn.

CONCEALMENT OF BIRTH is a statutory offense, created in England by 21 Jas. I. c. 27 (1624). That statute provided that if any woman who was delivered of a child which would be a bastard if born alive endeavored to conceal the birth by burying, drowning, or the like, she should suffer death, unless she could prove by at least one witness that the child was born dead. Even Blackstone was forced to admit that this law "savored pretty strongly of severity," and it has been modified from time to time. At present the English statute provides that any person who endeavors to conceal the birth of a child by any secret disposition of its dead body, whether it died before, at, or after its birth, is guilty of a misdemeanor. While the statutes of our States on this subject differ in some respects, most of them are characterized by the milder spirit of the modern English acts. Consult the authorities referred to under MEDICAL JURISPRUDENCE; CRIMINAL LAW.

BIRTHS, REGISTRATION OF. The first nation to provide for the public registration of births was England. Church registers had long been kept, but in 1837 a registrar-general's office was established. The registration, however, was voluntary until 1876. The Continental countries soon adopted the system, and made it complete and effective. In England the still-births are not included in the returns, but are recorded separately. On the Continent they are included. As they form 2 or 3 per cent. of the total, this should be remembered in comparing returns.

It is a matter of great regret that no comprehensive plan is adopted in the United States. Massachusetts was the first State to undertake registration, and many other States have followed. The returns are far from complete.

The birth-rate is expressed by the ratio of births to 1000 of population. Russia is supposed to have a rate of 49 per 1000. Hungary, with 44, is the highest for countries having registration. Germany has 38; England and Wales, 34; France, about 24. The census of 1890 estimated that in the United States the rate among immigrants was 38.29; native parents, 26.35; negroes, 29.07; the total average being 26.68. In all civilized lands about 1050 boys are born to 1000 girls.

The birth-rate is influenced by social and economic conditions, war, famine, abundance, etc. In all countries the rate decreases among the well-to-do. The city makes its influence felt in a decreasing rate. (See ILLIGITIMACY.) The physiological and social laws governing the birth-rate are as yet but little understood.

Consult: Richard Mayo-Smith, *Statistics and Sociology* (New York, 1895); for England, the reports of the Registrar-General; for Germany, *Jahrbuch der deutschen Städte;* for France, Levasseur, *La population française*, 3 vols. (Paris, 1889-92); for Austria-Hungary, *Ungarisches sta-*

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tistisches Jahrbuch and *Osterreichisches statistisches Handbuch;* for Italy, *Annuario statistico.*

BIRTHMARK. See NÆVUS.

BIRTHMARK, THE. A story in Hawthorne's *Mosses from an Old Manse.*

BIRTHRIGHT. A preference in inheritance accorded by law to an heir according to the order of his birth. Such preference may be exclusive, as in the English rule of primogeniture (q.v.), which gives the entire real estate to the eldest male heir, and in the singular custom of borough English (q.v.), under which it goes to the youngest son; or it may be proportional, only giving the eldest son, or the youngest, as the case may be, a larger share in the estate than is appropriated to the other heirs. It is in this latter sense that we must understand the term as employed in early Hebrew history; and this has, perhaps, been its usual form. The right, in one or another of these forms, prevailed in all stages of primitive society, though with advancing civilization it has gradually given place to the more equitable principle of an equal division of the property among all the heirs of a given class. Its survival in England is probably due quite as much to the conservative temper of the English people as to the existence of social conditions which tend to perpetuate it. Almost everywhere else, on the Continent of Europe as well as in the United States and the colonies of Great Britain, it has completely disappeared. See HEIR; INHERITANCE.

BIRTHWORT. See ARISTOLOCHIA.

BIS (Lat., twice). In music, a term which denotes that the passage over which it is placed is to be played twice, or repeated. Such passages generally have a slur or bow over them, and the word 'bis' written below it, thus: Bis.

BISAYA, bē-zä'yȧ. See VISAYA.

BISCACHA, bĭs-kä'chȧ. See VIZCACHA.

BIS'CAY (Sp. *Biscaya, Vizcaya,* a Spanish province named after the *Basques*), BAY OF (the Roman *Sinus Aquitanicus* or *Gallicus Oceanus,* and the French *Golfe de Gascogne*). A portion of the Atlantic Ocean sweeping in along the northern shores of the Spanish Peninsula in an almost straight line from Cape Ortegal to Saint Jean de Luz, at the western foot of the Pyrenees, and thence curving along the west shores of France northward to the western extremity of Brittany and northwestward to the island of Ouessant. Its extreme width and length are about 400 miles each. The whole of the south coast is bold and rocky, in some places rising to a height of several hundred feet, and broken by inlets, some of which form safe and commodious harbors. From the mouth of the Adour to the Gironde, the shore presents a totally different aspect, being low and sandy, with numerous lagoons, the embouchures of these two rivers forming the only harbors. For 200 miles north of the Gironde the coast is still low, but marshy instead of sandy, and from the peninsula of Quiberon westward it is moderately elevated and rocky in some places. The rivers falling into the bay on the Spanish shores are unimportant. On the coast of France it receives, through the rivers Loire, Charente, Garonne (the estuary of which is called the Gironde), and Adour, the waters of about one-half the surface of the whole country. Its chief ports are Gijón, Santander, Bilbao, San Sebastian, and Pasajes in Spain; and Bayonne, Bordeaux, Rochefort, La Rochelle, Nantes, and Lorient in France. Its chief islands—which are all situated north of the Gironde—are Belle-Ile, Ré, Noirmoutier, and Oléron. Navigation is rendered difficult and dangerous by the prevalence of northwest winds, and by the existence of the violent Rennel's current. The depth of the bay ranges from 100 feet or less along the shore to more than 10,000 feet in the central part. The height to which the tides rise is hardly exceeded anywhere.

BISCEGLIE, bē-shä'lyȧ (anciently, Lat. *Vigiliæ*). A city in south Italy, on the Adriatic, 21 miles northwest of Bari. The harbor admits vessels of small burden only. The principal buildings are the cathedral, two churches, dating from the Twelfth Century, a dilapidated Norman castle, and the palaces of the old families. In the country, which produces excellent wine and currants, there are many magnificent villas. During the Crusades Bisceglie was famous for the hospital founded by Bohemond for pilgrims, of which some ruins still exist (Map: Italy, L 6). Population, in 1881, 24,000; in 1901, 30,385.

BISCHOF, bĭsh'ŏf (Ger., bishop), KARL-GUSTAV CHRISTOPH (1792-1870). A German chemist and geologist. He was born in Nuremberg, and in 1822 became professor of chemistry and mineralogy at Bonn. He obtained the prize of the Scientific Society of Holland for his treatise on internal terrestrial heat, and published in England, in connection with it, *Researches on the Internal Heat of the Globe* (London, 1841), which was followed by a number of papers on connected geological subjects. The results of his researches (1837-40) on inflammable gases in coal-mines, and on safety-lamps, appeared in the *Edinburgh New Philosophical Journal* and other periodicals. His chief work, *Lehrbuch der Chemischen und physikalischen Geologie* (3d ed., Bonn, 1863-66), is an important contribution to the study of the physical and chemical problems of geology.

BISCHOF, MARIE. See BRANDT, MARIANNE.

BISCHOFF, JOSEPH EDUARD KONRAD; pen-name, Konrad von Bolanden (1828—). A German novelist. He was born at Niedergailbach and after studying at the Catholic Theological Seminary at Munich was ordained a priest at Speyer in 1852. Afterwards he retired from the ministry to devote his entire attention to literary work. His publications consist of historical novels and romances attacking the Reformation, the political and literary movements of the Eighteenth Century, and the progress of contemporary science. His best-known works are: *Franz von Sickingen* (1859); *Historische Novellen über Friedrich II. von Preussen und seine Zeit* (1872); *Angela* (1872); *Gustav Adolf* (1867-70); *Die Bartholomäusnacht* (1879); *Die Socialdemokraten und ihre Väter* (1894); *Deutsche Kulturbilder* (1893-94); and *Otto der Grosse* (1898). His complete works appeared in 1871. Consult Keiter, "Konrad von Bolanden," in *Unsere Zeit,* Vol. I. (Leipzig, 1876).

BISCHOFF, THEODOR LUDWIG WILHELM (1807-82). A German anatomist and physiologist. He was born in Hanover, and became professor of anatomy at Heidelberg in 1836. From Heidelberg he removed, in 1844, to the University

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of Giessen, and in 1855 to that of Munich. He devoted himself especially to embryology, to which he made many contributions. His *Entwickelungsgeschichte des Kaninchenei* (1843) received the prize from the Berlin Academy. Of his numerous writings in Müller's *Archiv*, and published separately, may be singled out the *Beweis der von der Begattung unabhängigen periodischen Reifung und Loslösung der Eier der Säugetiere und des Menschen* (Giessen, 1844), in which he establishes the important doctrine of the periodic ripening and detachment of the ova in mammalia and man, independently of generation. Being called upon in 1850, together with Liebig, to give his opinion in the famous Görlitz trial (q.v.), which involved the question of the possibility of spontaneous combustion, he took occasion to publish a dissertation on the subject, *Ueber die Selbstverbrennung* (demonstrating the impossibility of spontaneous combustion), which appeared in Henke's *Zeitschrift für die Staatsarzneikunde* (1850).

BISCUIT (for older E. *bisket;* Fr. *biscuit*, twice-baked, from *bis*, twice + *cuire*, to bake; cf. Ger. *Zweiback*). A kind of hard, dry bread baked in small, thin cakes. In the United States this kind of bread is usually called crackers, the name biscuits being applied to small, round, soft cakes made from dough, raised with yeast or soda, sometimes shortened with lard, etc. Biscuits or crackers are usually made of flour, water or milk, and salt, to which are added, for special varieties of biscuits, sugar, spices, butter, eggs, dried fruits, prepared meats, etc. The varieties of biscuits now made are very numerous, but practically the same mode of procedure is adopted in making them all. The ingredients are first mixed by machine to form a dough, and this dough is mechanically kneaded, rolled out thin, and cut into squares or disks, which are carried through the ovens on traveling frames or belts, and baked in about fifteen minutes. The baked biscuits are next dried for several days, and finally packed in one of a variety of forms for shipment. (See BREAD.) For *Meat Biscuit*, see RATIONS, paragraph on *Campaign Rations*.

BISCUIT. A term applied in pottery to porcelain and other earthenware after the first firing, and before it has received the glaze and embellishments. (See PORCELAIN and POTTERY.) In this condition the ware is very porous, and allows water very slowly to percolate through its pores.

BISCUITROOT. See QUAMASH.

BISERTA, bē-zĕr'tȧ. A mediæval term for the classical Utica, in Africa, used by Ariosto in his *Orlando Furioso* for the capital of King Agramant.

BISHARIN, bē'shȧ-rēn' (Ar. plur. of *Bishari*). The designation of a group of tribes living between the Red Sea, the Nile, and Abyssinia. Properly they form the northern division of the Beja, while the southern members of the group are called Hadendoa. The Bisharin are nomadic herdsmen, and are nominally Mohammedans. Those living near the borders of Egypt have the reputation of being sturdy beggars. They present physically a fine Caucasian type, and they speak a highly developed Hamitic language, of which there are grammars by Almkvist (Upsala, 1881-85) and Reinisch (Vienna, 1893). For an account of the Bisharin, consult Munzinger, *Ostafrikanische Studien* (Schaffhausen, 1864).

BISHOP. The title of the highest order of clergy in the Christian Church. The name is in the Saxon *biscop*, and comes from the Greek ἐπίσκοπος, *episkopos*, an overseer, from ἐπί, *epi*, upon + σκοπεῖν, *skopein*, to watch. The Athenians used to send officers called ἐπίσκοποι, *episkopoi*, to their subject States. The word was adopted by the Romans, and Cicero speaks of himself as an *episcopus* in Campania; it was also applied by them to the officers who inspected the provision-markets. There are two theories as to the functions of a bishop in the primitive Church, which may be described as the Episcopalian and the Presbyterian theories. The question between them is whether the episcopate is necessary to the very existence of a church or only to its orderly regulation; in other words, to its *esse* or to its *bene esse*.

According to the former, the first bishops in the Church of Christ were His apostles; "for the office whereunto Matthias was chosen is termed (Acts i. 20) *episcopē*—i.e. an episcopal office, which being spoken expressly of one, agreeth no less unto them all; and therefore Saint Cyprian, speaking generally of them all, calls them bishops." The form of government at first established by the Apostles was that the laity or people should be subject to a college of ecclesiastical persons appointed for that purpose in every city. These, in their writings, they term sometimes 'presbyters,' sometimes 'bishops.' Thus Saint Paul to the elders at Ephesus says: "Take heed to the flock over which the Holy Ghost hath made you *overseers*"—i.e. bishops. This explains the Presbyterian view of the office. But as the Apostles could not themselves be present in all churches, and as in a short time strifes and contentions arose, they appointed, after the order began at Jerusalem, some one president or governor over the rest, who had his authority established a long time before that settled difference of name took place whereby such alone were called bishops; and therefore, in the Book of Revelation, we find that they are entitled 'angels.' Saint Irenæus, martyred about the beginning of the Third Century, says: "We are unable to number up them who by the Apostles were made bishops." In Rome, he tells us, they appointed Linus; and in Smyrna, Polycarp. Saint Ignatius witnesses that they made Evodius Bishop of Antioch. Saint Jerome says: "All bishops are the Apostles' successors"; and Saint Cyprian terms bishops "*præpositos qui apostolis vicaria ordinatione succedunt*" (presidents who succeed to the Apostles by vicarious ordination). Hooker says, in his usual judicious manner: "Such as deny apostles to have any successors at all in the office of their apostleship, may hold that opinion without contradiction to this of ours, if they will explain themselves in declaring what truly and properly apostleship is. In some things, every presbyter, in some things only bishops, in some things neither the one nor the other, are the Apostles' successors." And he adds, what fairly states the Episcopal theory on this subject: "The Apostles have now their true successors, if not in the largeness, surely in the kind of that episcopal function whereby they had power to sit as spiritual ordinary judges, both over laity and over clergy, where churches Christian were established." We find, also, that

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throughout those cities where the Apostles did plant Christianity, history has noted a succession of pastors in the seat of *one*, not of many; and the first one in every rank we find to have been, if not some apostle, yet some apostle's disciple. By Epiphanius, the bishops of Jerusalem are reckoned down from Saint James to his own time; and Tertullian, writing in the Second Century, has the following: "Let them show the beginnings of their churches, let them recite their bishops one by one, each in such sort succeeding other that the first bishop of them have had for his author and predecessor some apostle, or at least some apostolical person who persevered with the Apostles; for so apostolical churches are wont to bring forth the evidence of their estates." The judgment of the Church of England, as to the primitive existence of bishops, is to be found in the preface to the ordination service, drawn up in the reign of Edward VI., where it is said: "It is evident unto all men diligently reading the Holy Scripture and ancient authors, that from the Apostles' time there have been these orders of ministers in Christ's Church—bishops, priests, and deacons." Saint Thomas Aquinas, however, distinguishes technically by saying that "the episcopate is not an order, but a dignity within an order." Accordingly, in the Roman Catholic Church, while ordination has always been performed by bishops, some other functions usually considered episcopal are at times delegated to priests; thus confirmation is occasionally administered by priests—with oil, however, blessed by a bishop.

According to the other, or Presbyterian theory of bishops, the origin and general history of the institution are thus sketched. In the earliest churches no traces of a hierarchy, it is affirmed, are to be found. The superintendents or directors appointed over the first churches by the Apostles or chosen by the members of the congregations, were unquestionably styled indifferently presbyters or bishops—the former title being borrowed from the Jewish synagogue, the superintendent or director of which was called the elder (Gr. *presbyteros*); the latter (*episcopos*) being familiar to the heathen converts as the title of a civil office corresponding in function to that of a Christian pastor. But this original equality did not last long. As new churches multiplied, those formed round the original church, though each having its own bishop or presbyter, remained in confederacy; and in the meetings of the pastors to regulate the common affairs one must of necessity preside, most likely determined by age, superior piety, or other qualification. From this simple circumstance, as is indicated by Clemens Alexandrinus in the beginning of the Third Century, sprang the habit of looking upon one of the bishops as superior to the others; and this superiority, at first personal and accidental, soon came naturally to be regarded as attached to the bishop of a particular congregation. In his case the word bishop came to signify an overseer of pastors rather than an overseer of people. The monarchical form of State government favored this tendency, and converted the president of a presbytery into the privileged superintendent of his brother pastors. The assumption was resisted by the presbyters at first, but from the middle of the Fifth Century episcopacy, or the domination of bishops, continued to gain the upper hand over presbyterianism, or equality of all pastors.

In the Third Century bishops appear still dependent on the advice of their presbyters and the consent of the people, and shared with the former the office of teaching and the cure of souls. As yet their exclusive privileges or functions were limited to confirmation, ordination of ministers, consecration of sacred things, settlement of secular differences among Christians, and management of the revenues of the Church. But the tendency to subordination and unity did not rest here. Among the bishops, at first all equal, those of the larger and more important cities began gradually to acquire a superiority over those of inferior cities. When Christianity was made the religion of the Roman Empire, the bishops became more and more monarchical, and put themselves on the footing of ecclesiastical princes. The chief cities of the larger civil provinces rose to be seats of extensive dioceses, the bishops of these assuming the distinctive titles of *patriarch*, *metropolitan*, *papa*—titles of courtesy that had long been applied to all bishops; while the less important provinces, with their capitals and bishops, became subordinate. Among these provincial bishops, again, three, from obvious causes, acquired a prominence that cast all the rest into the background—namely, Alexandria, Constantinople, and Rome. The beginnings of the ascendency of the Roman Pontiff, whatever may be thought of its claim to divine institution, are indisputably discernible as early as the end of the Second Century.

In the Roman Catholic Church the episcopal office is the foundation of the whole system. Christ's Apostles are held to have transferred their functions to the episcopacy as a body. Every bishop, therefore, exercises within his own diocese, first, the *jus magisterii*—i.e. the right of maintaining and propagating the orthodox faith; and second, the *jus ordinis*, or regulation of the sacred and mysterious rites of the priestly office, some of which are transferred to the inferior clergy, as *jura communia*, while others remain the privileges of the bishop (*jura propria*). Among episcopal prerogatives, in addition to those already mentioned as assigned to them in the Third and Fourth centuries, are anointing of kings, consecration of abbots, etc. They have also the management of the Church property in their respective dioceses, and the oversight of all ecclesiastical institutions. They are appointed by the Pope. In the United States, the clergy of the diocese who are entitled to share this function send to Rome a list of three names in order of preference, designating them as *dignissimus*, *dignior*, and *dignus;* a similar list is submitted by the other bishops of the province. The Pope may be guided by these recommendations and nominate one of these men, or he may set the lists aside altogether and make his own selection. In some European and South American countries, as a result of past compromises or concordats, the head of the State is allowed to nominate, subject, of course, to Papal confirmation. The consecration takes place normally at the hands of three bishops, this number having been required from post-Apostolic times, though a single consecrator would suffice for validity. After the elaborate ceremonies of consecration, the new bishop takes his place upon his throne, and gives his blessing to the people committed to

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his oversight. (For the duties of the special vestments worn by Roman Catholic bishops, see COSTUME, ECCLESIASTICAL.) In case of the incapacity through age or infirmity of a diocesan prelate, an assistant or coadjutor bishop is appointed, who bears the title of some extinct see *in partibus infidelium*, it being contrary to ancient usage to consecrate a bishop with a roving commission. See TITULAR.

In the Greek Church the office of bishop is essentially the same, though the powers of the incumbent are somewhat more restricted. Greek bishops are practically always chosen from the monastic orders, and generally from the archimandrites or abbots of those orders.

The episcopal office in its essentials has practically disappeared from the Protestant communities of the Continent of Europe, although the title has been retained in Sweden, Norway, and Denmark. The bishops of the two former countries, while they are, from the ecclesiastical standpoint, no more than the superintendents of other Lutheran churches, have retained some of their ancient prerogatives, such as seats in Parliament, and still use the mitre, pallium, and crosier. In Germany the title has occasionally appeared in modern times among the Protestant churches, having been conferred, for example, by Frederick I. and Frederick William III.

In no other Protestant country have the prerogatives and revenues and functions of bishops remained so little impaired as in England, where the Reformation was guided by the King's own hands, and, being propagated from above downward, was effected in a very conservative spirit. Episcopacy was abolished by law under the Commonwealth; but at the Restoration the bishops were also restored, being connected closely in the thought of the time with monarchy, on James I.'s principle of "no bishop, no king," and have since retained their position in Church and State. The mode of election and confirmation is the same in the cases of bishops and archbishops, for each archbishop is also a diocesan prelate. They are elected by the chapter of each cathedral church by virtue of a license from the Crown; this is the theory, but actually the bishops of the Church of England are appointed by the Crown on the advice of the Prime Minister, since no chapter ventures to disregard the nomination which accompanies the *congé d'élire*. In early Christendom the laity used to take part in the election; but from the tumults that arose, the different sovereigns of Europe took the appointment, in some degree, into their own hands by reserving to themselves the right of confirming these elections, and of granting investiture to the temporalities which now began to be annexed to these dignities. This right was acknowledged as belonging to Charlemagne by Pope Adrian I., A.D. 773, and the Council of the Lateran. The right of appointing to bishoprics is said to have been in the Crown of England even in Saxon times. But when, by length of time, the custom of electing by the clergy only was fully established, the Popes began to object to the usual method of granting these investitures, which was *per annulum et baculum*—i.e. by the prince delivering to the prelate a ring and pastoral staff or crosier. In the Eleventh Century Pope Gregory VII. published a bull of excommunication against all princes who should dare to confer investitures. There were long and eager contests occasioned by this Papal claim, but at length the matter was compromised, the Emperor Henry V. agreeing to confer investitures for the future *per sceptrum*, while the kings of France and England consented to receive only the homage for the temporalities, instead of investing them by the ring and crosier, the Pope keeping in his hands the power of confirmation and consecration. Tis concession was obtained from Henry I. of England; but King John, to obtain the Pope's protection against his barons, gave up, by a charter to all monasteries and cathedrals, the free right of electing their prelates. This grant was confirmed in Magna Charta, and was again confirmed by Statute 25 Edward III. But by Statute 25 Henry VIII. the ancient right of nomination was in effect restored to the Crown. The sovereign, on the vacancy being notified, sends to the dean and chapter a letter missive, or *congé d'élire*, containing the name of the person to be elected; and if they do not elect in the manner appointed by the act, or if the archbishop or bishop appointed for the purpose refuse to confirm, invest, and consecrate the bishop-elect, the recusants incur the penalty of a *præmunire* (q.v.). A bishop cannot be *deposed*, as it is supposed that the order itself cannot absolutely be taken from him; he may, however, be *deprived*, as was done to the Bishop of Clogher in 1822; he may also resign his see; and he may be removed from one see to another, which is called *translation;* but this practice is now less frequent than it used to be. The Dean and Chapter of Canterbury claim it as an ancient right of that church that every bishop of the province is to be consecrated in it, or the archbishop to receive from them a license to consecrate elsewhere; and it is said that a long succession of licenses to that purpose are regularly entered in the registry of that church. Bishops, upon their election, become peers of the realm, and are summoned to Parliament as well as the other nobles; but the right under which they sit there, whether in respect of their baronies, or by usage and custom, is a matter of uncertainty. It appears, however, that the bishops sat in the Witenagemote, under the Saxon monarchs, as spiritual persons; for they were not barons until William the Conqueror turned their possessions into baronies, and subjected them to the tenure of knights' service. The bishops created by Henry VIII.—viz., Bristol, Gloucester, Chester, Oxford, and Peterborough, as also some lately created bishops—sit in Parliament, though they do not hold their lands by baronial tenure. The bishops withdraw from the House (under protest, however) when any capital charge is to be decided. The bishops sit in Parliament next to the Archbishop of York: first, London; second, Durham; third, Winchester; and then the rest in the order of the foundation of their sees. In respect of their persons, bishops are not peers with the nobility; and in case of alleged crimes they are tried by a jury in the same manner as commoners, as was the case with Cranmer and Fisher. When a see is vacant, the archbishop of the province is guardian of the spiritualities; but he cannot as such consecrate or ordain or present to vacant benefices. The sovereign has custody of the lay revenues during a vacancy. Queen Elizabeth kept the See of Ely vacant nineteen years.

Including the two metropolitans, there are thirty-five diocesan bishops in England, most of

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them bearing the titles of pre-Reformation sees. They are Canterbury, York, London, Durham, Winchester, Bangor, Rochester, Exeter, Peterborough, Saint David's, Worcester, Chichester, Lichfield, Ely, Oxford, Saint Asaph, Manchester, Hereford, Chester, Landaff, Lincoln, Salisbury, Bath and Wells, Carlisle, Gloucester, Bristol Ripon, Norwich, Sodor and Man, Truro, Saint Albans, Liverpool, Newcastle, Southwell, and Wakefield. There is also a constantly increasing number of suffragan or assistant bishops—at present twenty-four—who bear territorial titles, but have no independent jurisdiction and no seats in Parliament. The Episcopal Church of Scotland has seven bishops, and that of Ireland two archbishops and eleven bishops. The first colonial bishopric of the Anglican communion was that of Nova Scotia, founded in 1787; but the Nineteenth Century saw a prodigious increase in their numbers. There are now 23 in British North America, 8 in the West Indies, 10 in India and Ceylon, 16 in Australia, 7 in New Zealand, and 24 under the direct jurisdiction of the Archbishop of Canterbury, mostly in non-Christian lands. There are now 229 bishops in the Anglican communion.

In the Protestant Episcopal Church of the United States, the functions of the bishops, in religious matters, are similar to those of English prelates. In political affairs they have, of course, no official power. They are chosen to office by the convention of clerical and lay deputies of the diocese over which they are to preside, except in the case of missionary bishops, who are nominated by the House of Bishops and elected by the House of Clerical and Lay Deputies. There are at present eighty-nine in the House of Bishops.

In England, under the Archbishop of Westminster as primate, there are fifteen Roman Catholic bishops. The hierarchy here was restored in 1850, and in 1878 in Scotland, where there are two archbishops and four bishops. The assumption of territorial titles by Roman Catholic bishops in England and Scotland was made illegal by the Ecclesiastical Titles Act of 1851; but the law, passed in a moment of great popular excitement, has always been a dead letter. In Ireland there are four Catholic archbishops and twenty-six bishops. In the United States the Church has fourteen archbishops, with the Archbishop of Baltimore as primate, and seventy other diocesan bishops, besides three vicars apostolic.

In the Methodist Episcopal Church, the bishops are elected by the General Conference. Their duties are those included in a general superintendence of the whole Church. Authority is vested in them all, and its administration distributed among them by mutual agreement. They preside over meetings of the annual conferences, ordain ministers, and appoint them to their fields of labor. There are 18 in the Northern branch and 10 in the Southern Church. They have no dioceses and are all itinerant. The Reformed Episcopal Church has 8 bishops, and the African Methodist Episcopal Church 7. Other Protestant bodies in the United States have adopted the episcopal form of government, among them the United Brethren in Christ and the Evangelical Association. See ARCHBISHOP; APOSTOLIC SUCCESSION.

For the discussion of the theory, consult: Lightfoot, *Saint Paul's Epistle to the Philippians* (London, 1868); Baur, *Das Christenthum und die christliche Kirche der ersten drei Jahrhunderte* (Tübingen, 1853); Hatch, *Organization of the Early Christian Churches* (London, 1881); Wordsworth, *Theophilus Anglicanus* (London, 1843); Döllinger, *The First Age of the Church* (Eng. tr. Oxenham, London, 1866); Moberly, *Ministerial Priesthood* (London, 1898); Reville, *Les origines de l'épiscopat* (Paris, 1894).

BISHOP. A beverage best known in England, composed of red wine (claret, Burgundy, etc.) poured warm or cold upon ripe bitter oranges, sugared and spiced to taste, and drunk either hot or cold. The oranges should be carefully selected, and the white part between the peel and pulp thrown away. If white wine be used, the beverage is called *cardinal;* and with Tokay it becomes *pope.* 'Bishop' was known under other names in Germany during the Middle Ages, having been imported into that country from France and Italy; its present name seems to have been bestowed during the Seventeenth Century.

BISHOP, ANNA RIVIÈRE (1814-84). An English operatic singer, born in London. She was the wife of the composer Sir Henry Rowley Bishop. Her first appearance was in 1837, and she soon became widely known in Europe and America. In 1839 she sang in the principal cities of the Continent. She returned to England in 1846, and in the following year came to America and became an exceedingly popular singer in the United States, Canada, and Mexico. She married Martin Schultz, a New York merchant, in 1858. In 1866 she sang in Manila and China. She lost her voice in 1868 and retired from the stage.

BISHOP, Sir HENRY ROWLEY (1786-1855). An eminent English composer of music. He was born in London. His principal musical instructor was Signor Francesco Bianchi, an opera composer settled in London. In 1806 Bishop was appointed composer of ballet music at the opera. The opera *Circassian Bride* (1809) won a triumph at Covent Garden, and a long list of works for the stage followed. His most popular operatic compositions were *Guy Mannering; The Slave; The Miller and His Men; Maid Marian; Native Land; The Virgin of the Sun*—all remarkable for their flowing melodies, animated style, and true musical power. From 1810 to 1824 he was director of the music at Covent Garden Theatre. One of the first directors of the Philharmonic Society, he for many years conducted the concerts of ancient music. He arranged several volumes of the *National Melodies,* and succeeded Sir John Stevenson as arranger of the airs selected by Moore for his *Melodies.* Bishop composed the familiar music to John Howard Payne's *Home, Sweet Home.* In 1839 he received the degree of bachelor of music from the University of Oxford, and in 1841 was elected Reid professor of music in the University of Edinburgh. In 1842 he was knighted. He resigned his Edinburgh chair in 1843, and in 1848 was elected professor of music in the University of Oxford.

BISHOP, ISABELLA BIRD (1832—). An English traveler and author. She was born in Yorkshire, England, October 15, 1832, the daughter of Rev. Edward Bird. She began traveling in

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North America at an early age, and later spent thirteen years in Asia, showing skill, courage, and tact. Married to John Bishop, M.D., in 1881, and widowed in 1886, she continued her travels, lectures, and writing. In 1892 she was elected a Fellow of the Royal Geographical Society. Her nine volumes of travel (many of which first appeared under her maiden name, Bird) on North America, Hawaii, Japan, the Malay Peninsula, Persia, Kurdistan, Tibet, Korea, Siberia, China, and Morocco, show great ability. In 1901 she went on a philanthropic mission to India. Among the best-known of her books are *Korea and Her Neighbors* (1898) and *The Yangtse Valley and Beyond* (1900).

BISHOP, SETH SCOTT (1852—). An American physician, born at Fond du Lac, Wis. He graduated in 1876 at Northwestern University (Evanston, Ill.), and subsequently was appointed professor of otology at the Chicago Post-Graduate Medical School and Hospital and professor of diseases of the nose, throat, and ear at the Illinois Medical College. He became an editor of *The Laryngoscope*, and published a work on *Diseases of the Ear, Nose, and Throat, and Their Accessory Cavities.*

BISHOP, WILLIAM HENRY (1847—). An American novelist and graduate of Yale University, 1867. The best-known of his novels and sketches are: *Detmold* (1879); *The House of a Merchant Prince* (1882); *Choy Susan and Other Stories* (1884); *Fish and Men in the Maine Island* (1885); *The Golden Justice* (1887); *The Brownstone Boy and Other Queer People* (1888); *A House Hunter in Europe* (1893); *Writing to Rosina* (1894). *Old Mexico and Her Lost Provinces* (1883) is a book of travel.

BISH'OP-AUCK'LAND. A town in the county of Durham, England, 9 miles southwest of the city of Durham, on an eminence near the confluence of the Wear and Gaunless (Map: England, E 2). There is a fine town hall, dating from 1863. The chief building of interest, however, is the palace of the Bishop of Durham, a large pile covering some five acres in the midst of a park. The principal industries of the town are cotton manufactures, and in the neighborhood are several collieries. Population, in 1891, 10,500; in 1901, 12,000.

BISHOP BLOU'GRAM'S APOLOGY. A fine dramatic monologue by Robert Browning, in which, among other significant points made, it is held that the vitality of faith is conditioned on healthy doubt.

BISHOPS' BOOK. A primer of doctrine and instruction, compiled by a commission of bishops and ministers of the English Church, in 1537, and known also as *The Institution of a Christian Man.* It contains an exposition of the Apostles' Creed, the Seven Sacraments, the Ten Commandments, the Lord's Prayer, and the doctrines of justification and purgatory. It is contained in *Formularies of Faith Put forth by Authority during the Reign of Henry VIII.* (Oxford, 1823). Consult Hardwick, *Reformation* (London, 1856).

BISH'OPSGATE'. A quaint London street, so called from a gate of that name, which once stood in the north wall of the city, and which was destroyed in 1812.

BISKRA, or **BISKARA,** bēs'kä-rä (named after the tribe *Biskri*). A town and commune in the Department of Constantine, Algeria, on the south side of the Aures Mountains, 117 miles southwest of Constantine by rail. It is the most important military post of the district, and formerly had a large caravan trade between the Sahara and the Tell (Map: Africa, E 1). Biskra is situated in the midst of a highly fertile oasis, rich in date-palms and olives. The climate is the warmest in Algeria, the summer temperature rising often above 120° F.; in winter, however, the freezing-point is not infrequently reached. The town has broad streets, with substantial houses, a fort, barracks, caravanserai, and hospital. Burnous and carpets are manufactured, and iron, limestone, and saltpeter are mined in the neighborhood. The Zaba of the Romans, it was an important town under the Moors, but declined after the plague of 1863, by which 71,000 inhabitants perished. In 1844 it was taken by the French, with whom it has become a favorite health resort. Population (commune), in 1891, 7166; in 1896, 8417.

BISMARCK, bĭz'märk. The capital of North Dakota, and county-seat of Burleigh County, on the Missouri River, and on the Northern Pacific Railroad (Map: North Dakota, E 3). It has an attractive situation on the east bank of the river, which is here crossed by a magnificent bridge of steel and iron, 50 feet above high water, and contains a fine court-house, several Federal institutions, the State penitentiary, the State Library, and Saint Alexius's Hospital. The capitol, completed in 1894 at a cost of half a million dollars, is the most prominent building. The city controls a very extensive river trade, the principal articles of commerce being coal, with which the surrounding region is underlaid, grain, hides, etc. The industrial establishments include grain-elevators, a large flouring-mill, brewery, etc. Lewis and Clark spent the winter of 1804-05 on or near the site of Bismarck, which was permanently settled in 1873 and incorporated shortly afterwards. In 1883 it was made the capital of Dakota Territory, and in 1889 was chosen as the State capital of North Dakota. The government, under a general State law of 1900, is vested in a mayor, elected every two years, who has important appointive powers in municipal offices, and a city council. Population, in 1890, 2186; in 1900, 3319.

BISMARCK, bĭz'märk, *Ger. pron.* bēs'märk, FRIEDRICH WILHELM, Count (1783-1860). A German soldier and military author. He was born at Windheim, Westphalia, and was a member of the Rhenish branch of the Schönhausen line of the Bismarck family. He served with Hanoverian, and afterwards with Nassau regiments, and in 1804 became a member of the English German Corps. Compelled to resign from the English service because of a duel, he entered the calvary service of Württemberg, at that time in alliance with France. He greatly distinguished himself in the campaigns against Austria (1809) and Russia (1812). After the battle of Leipzig he was employed in various diplomatic missions in the service of Württemberg. He was a prolific writer, especially on cavalry tactics, and a great admirer of Napoleon, whose later campaigns he describes in the work entitled *Aufzeichnungen* (1846). Among his other publications are the following: *Vorlesungen über die Taktik der Reiterei* (1826); *Reiterbib-*

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liothek, 6 vols. (1825-31); *Ideentaktik der Reiterei* (1829).

BISMARCK ARCHIPELAGO, är'kĭ-pĕl'ä-gō (so renamed in honor of Bismarck). A group of islands in the Pacific Ocean, situated about 56 miles east of New Guinea, and extending from latitude 2° to 6° 30′ S., and longitude 148° to 155° E. (Map: Australasia, G 3). Its area is estimated at 20,000 square miles, and it comprises the islands of New Pomerania (New Britain), New Mecklenburg (New Ireland), New Laurenburg (Duke of York Islands), New Hanover, Admiralty, Anchorite, Commerson, Hermit, and a few others. The chief articles of export are copper and trepang. The annual imports and exports are valued at about a quarter of a million dollars each. The population is estimated at 188,000, and consists chiefly of Papuans. The group was declared a German protectorate in 1884 and placed under the control of the German New Guinea Company. Consult: Verbeck, "Die Entdeckung des Bismarckarchipels," in *Beiträge zur Kolonialpolitik und Kolonialwirtschaft* (Berlin, 1899-1900); Thilenius, "Geologische Notizen aus dem Bismarckarchipel," in Vol. LXXVIII., *Globus* (Brunswick, 1900).

BISMARCK-BOHLEN, bēs'märk-bō'lĕn, FRIEDRICH ALEXANDER, Count (1818-94). A Prussian soldier. He was born on the family estate at Karlsburg. From 1846 to 1848 he was the official military attaché and companion of Prince Frederick Charles at the University of Bonn. In 1864 he was raised to the rank of major-general, in which capacity he served in the Austro-Prussian War. Upon the conclusion of that campaign he was appointed Governor of Hanover (1866). He was commandant of Berlin in 1868, and Governor-General of Alsace-Lorraine during the Franco-Prussian War, upon the conclusion of which he was appointed adjutant-general to Emperor William.

BISMARCK BROWN. See COAL-TAR COLORS.

BISMARCK-SCHÖNHAUSEN, bēs'märk shēn'hou-zĕn, HERBERT NIKOLAUS VON, Prince (1849—). A German statesman, eldest son of Prince Otto von Bismarck. He was born in Berlin, and studied at the universities of Bonn and Berlin. He fought in the Franco-Prussian War, was wounded at Mars-la-Tour, and was appointed an officer September 2, 1870. In 1873 he entered the Foreign Office, and served at Bern and Vienna, acting subsequently as private secretary to his father from 1877 to 1881. In 1882 he was appointed counselor of legation at London, and in 1884 he was sent in a similar capacity to Saint Petersburg, whence he was in the same year transferred as Ambassador to The Hague. He became Under Secretary of State in 1885, and Secretary of State in 1886. After the resignation of his father (March 20, 1890) he retired from the diplomatic service and withdrew to his estate at Schönhausen. He was elected to the Reichstag in 1893 and 1898 as a member of the Conservative party, of which body he had also been a member from 1881 to 1886. The treaty of 1885 between Germany and England, relative to the colonial boundary question, was negotiated by him. He also presided at the Samoan Conference held in Berlin in 1889. By his marriage with the Countess Marguerite Hoyos (June 21, 1892), he had two sons and two daughters. His political speeches have been published by Penzler under the title *Politische Reden* (1899).

BISMARCK-SCHÖNHAUSEN, KARL OTTO EDUARD LEOPOLD VON, Prince (1815-98). First Chancellor of the German Empire. He was born April 1, 1815, at the family manor of Schönhausen, in the District of Magdeburg, Prussia. He was one of the six children of Karl Wilhelm Ferdinand von Bismarck, a captain of the Royal Body Guard of Prussia. His mother was the daughter of Herr Menken, a high official in the Prussian civil service. The family traced its lineage back directly for five centuries, and many of its members had held high positions in the military service of Brandenburg and Prussia and at Court. In 1832-33 Bismarck studied jurisprudence and political science at Göttingen, where he made the acquaintance of John Lothrop Motley, the American historian, an acquaintanceship which ripened into the strong friendship of later years. He studied for three semesters in Berlin, was admitted to the bar in 1835 and was referendary in Aix-la-Chapelle and Potsdam in 1836-37. In the latter city and in Greifswald he served his term in the army as lieutenant in the Life Guards. In Greifswald, too, he familiarized himself with the science of agriculture. On July 28, 1847, he married Johanna von Putkamer, and in the same year entered the first General Diet of Prussia, where he became known as an able and aggressive champion of ultra-conservative measures. In 1849 he was elected to the Second Chamber of the Prussian Diet, called into existence by the revolutionary outbreak of 1848, and as a member of that body and of the Erfurt Parliament (1850) he advocated an increase in the powers of the monarchy and the consolidation of the German people through the joint action of Prussia and Austria. At the same time he combated the Erfurt and Frankfort plans of union. In this early part of his career Bismarck gave little indication, except in his strenuous advocacy of Prussia's leadership, of the aims toward which his later activity was to be directed.

After holding the position of Prussian secretary of legation at Frankfort-on-the-Main, Bismarck was appointed, in 1851, Prussian Ambassador to the Germanic Diet at Frankfort. He had now apparently become convinced of the need of constitutional concessions in order to unite the German people, and of the inherent antagonism between the interests of Austria and the cause of German unity; for he adopted a more liberal programme and assumed that attitude of hostility to Austrian pretensions which he maintained so consistently and successfully. He was so outspoken in his opposition to Austria that it was deemed prudent, in 1859, on the eve of the Franco-Italian War against Austria, to transfer him to Saint Petersburg. There he labored effectively to strengthen the friendly relations between Russia and Prussia, and gained the highest esteem of Alexander II. When, on the death of Frederick William IV., January 2, 1861, William I. succeeded to the Prussian throne, Bismarck was transferred from Saint Petersburg to Paris, and in September, 1862, was called to the post of head of the Prussian Cabinet and Minister of Foreign Affairs. The King was then faced by a Diet which was in stubborn opposition to an army bill, but he

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found in Bismarck a minister daring enough to govern without a budget and without Parliamentary majority. In this manner began the lifelong alliance between King William and his great minister. Bismarck now entered upon his life-work, the unification of Germany under Prussian leadership, and the placing of the new Germany in the forefront of European nations. In pursuance of this object, he developed a thoroughly consistent and often ruthless policy, and carried it out without hesitation. Speaking to the Budget Commission of the Prussian Diet, September 30, 1862, he said:

"Our blood is too hot; we are fond of bearing an armor too large for our small body. Germany does not look to Prussia for liberalism, but for power. Let Bavaria, Württemberg, Baden, indulge in liberal ideas; no one will assign them the rôle destined for Prussia. Prussia must consolidate its might and nurse it for the favorable moment. Prussia's boundaries as determined by the Congress of Vienna are not conducive to its welfare as a sovereign State. Not by speeches and resolutions of majorities are the mighty problems of the age to be solved—that was the mistake of 1848 and 1849—but by blood and iron."

This much misunderstood statement, so characteristic of Bismarck, concisely summarizes the subsequent development of German history. Its full significance is elucidated by Bismarck in his *Autobiography*. Bismarck disliked war, but he saw no way of bringing the jealous German States together except through war. He regarded it as indispensable to drive Austria, as an essentially non-German and anti-national State, out of the Confederation, and he utilized the Schleswig-Holstein affair (see SCHLESWIG-HOLSTEIN) to antagonize Austria and finally to force an issue between that power and Prussia. At the same time he made Prussia the champion of the demand for a national German Parliament based on popular suffrage. This seemed so at variance with his earlier political course that Germany found it difficult to believe in his sincerity. Nevertheless, it was entirely consistent with the development of his character and opinions. He gained Austria over to his views in the Schleswig-Holstein matter, and with her cooperation entered upon the war against Denmark (1864). He won the confidence of Italy, formed an alliance between that State and Prussia, and when the Schleswig-Holstein controversy came to a crisis in the Germanic Diet, Prussia was ready for action. On June 1, 1866, Austria referred the settlement of the question to the Diet, and on June 10 Bismarck addressed to the German courts a letter setting forth Prussia's national policy. The following day Austria moved in the Diet for federal execution against Prussia, and the tie vote was decided in the affirmative, whereupon the representative of Prussia presented his Government's plan for a new national organization, declared the Confederation dissolved by its own action, and withdrew. Prussia at once invaded the German States that adhered to Austria, while the main Prussian Army was pushed into Austrian territory. The brief and brilliant campaign (see GERMANY and SEVEN WEEKS' WAR) secured the first object in Bismarck's programme. The Peace of Prague excluded Austria from the German Confederation, which was reorganized under a permanent Prussian presidency as the North German Confederation. It was still necessary to bring the South German States into the Union, to prick the bubble of Napoleon III.'s self-assumed leadership in European affairs, and to establish a more satisfactory western boundary for Germany by making the Rhine a truly German river. Bismarck forced an issue with France with the same relentlessness and the same certainty of result that had characterized the contest with Austria. The mistakes of the French diplomacy (see BENEDETTI) were utilized to the full, and France was goaded into a war to which she was wholly unequal. (See FRANCO-GERMAN WAR.) Throughout the war Bismarck was at the side of his sovereign, evincing in the course of the peace negotiations extraordinary determination and executive capacity. When on the 18th of January, 1871, King William of Prussia at Versailles accepted the title of Emperor of the new German Empire, Bismarck's policy had been vindicated. Before this his triumph had been won by constant contention against the centrifugal tendencies of the old Germany and in spite of the steadfast hostility of a large section of the German people. Now he became a popular idol. On April 16 the text of the Imperial Constitution was promulgated, and Bismarck, now created a prince, became the first chancellor of the new Empire. His next task was that of organizing the internal affairs of Germany upon the new basis, and of developing an Imperial policy worthy of a power of the first rank.

There is no ministerial responsibility under the Imperial Constitution of Germany, nor is the parliamentary opposition organized as it is in the United States and England. Bismarck never came to believe in the wisdom of popular majorities or control by a partisan Parliament. He saw the necessity of a popular basis for a strong government, but he believed above all in a strong executive. And the necessity of German unity was always uppermost in his mind. The promulgation of the doctrine of Papal infallibility by the Vatican Council of 1870 was odious to him as tending to weaken the loyalty of the German Catholics. In no sense intolerant of religions as such, he was opposed to any political religious organizations within the State, and he maintained this position both as Prussian Minister and as Imperial Chancellor. In January, 1873, he caused the introduction into the Prussian Diet of certain laws to regulate the relations of Church and State. Thus was brought on the six-years' struggle with the Clericals, known as the *Kulturkampf* (q.v.), in which Bismarck made the great mistake of his career, carrying his measures so far that in the inevitable reaction he was forced to acknowledge a virtual defeat. Bismarck's position seems to have been simply that of defending the authority of the State against outside interference. In 1874, replying to a Catholic attack in the Prussian Diet, Bismarck stated his principles clearly, acknowledging his duty to respect the dogmas of the Catholic Church merely as dogmas, and adding: "If the doctrine of infallibility be so interpreted as to lead to the establishment of an ecclesiastical *imperium in imperio;* if it lead to the nullification of the laws of this country because unapproved by the Vatican, I am naturally driven to assert the legitimate supremacy of the State. We Protestants are under

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OTTO VON BISMARCK
FROM A PAINTING BY FRANZ VON LENBACH

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the conviction that the kingdom of Prussia ought not to be ruled by the Pope, and we demand that you, the Ultramontane section of the Roman Catholics, respect our convictions as we do yours." The controversy led to an attempt upon Bismarck's life by a mechanic named Kullmann, in 1874. Finally, however, Ultramontane resistance drove Bismarck into an attitude of intolerance which proved untenable. Personally he had passed through four stages in his religious views, having arrived through rationalism, skepticism, and conventional Christianity at a profound religious conviction, with a firm faith in God and immortality. He was tolerant because he cared little for creeds and outward forms.

An equally difficult problem confronted Bismarck in the growing power of the Socialists. Two attempts on the life of the Emperor in 1878, by avowed Socialists, enabled the Chancellor to overcome the scruples of the Liberals in the Reichstag, and to secure the passage of special laws for the suppression of socialistic agitation. The *Kulturkampf* had brought Bismarck into alliance with the National Liberals; his conservative tendencies broke this alliance, and he came to an understanding with the Conservatives and Catholics. Now that he had suppressed the political activity of the Socialists for the time being, Bismarck very characteristically gave his attention to checking the movement by making many features of the Socialist programme his own, and he initiated a policy of paternalism, which was considered not far removed from State Socialism in some of its aspects. The most notable of the laws passed to placate the working classes were the sickness, accident, and old-age insurance acts of 1883-1889.

With the industrial and commercial development of the Empire, the time seemed ripe for expansion beyond the seas, and in 1884 Bismarck entered upon his colonial policy, at first halfheartedly. In a speech before the Reichstag, June 26, 1884, he declared his opposition to forced colonization, and his willingness to support only such a colonial policy as grew out of the need of protecting German subjects in foreign lands. He favored leaving the management of affairs largely to chartered trading companies, and added: "It is not our intention to found provinces, but to foster commercial enterprise." To stimulate industry and thereby to check the continuous emigration from Germany, Bismarck advocated a protective tariff. To settle the African question, as raised by the work of the International African Association, he arranged a conference at Berlin in 1884-85, which secured the recognition of the Congo Free State and laid down the lines upon which the partition of Africa has been effected. Bismarck was the author of the policy of subsidizing steamship lines from Germany to Asia, Africa, and Australasia. He never changed the conservative views on colonization that he had expressed in 1884, although circumstances forced him into action hardly consistent with those views. As early as 1865 he had advocated the Baltic and North Sea Canal, which was constructed after his retirement.

The genius of Bismarck was always most conspicuous in international affairs. He deliberately brought on three wars—with Denmark, Austria, and France—in order to further the great consummation of German unity. The German Empire once established, the great Chancellor's policy became one of peace. He avoided entangling Germany in the Eastern Question; but when the rivals of Russia were aroused by the Treaty of San Stefano, in 1878, he asserted Germany's leadership in Europe by inviting an international congress to meet at Berlin. (See BERLIN, CONGRESS OF.) He formed the Triple Alliance to secure Germany against both France and Russia, but at the same time maintained the most friendly relations with Russia. France he did not regard as a serious competitor of Germany after 1871. His matured convictions in regard to Germany's position are set forth in his autobiography. In that work, after some observations on Russia's relations to the Eastern Question, he observed that if Russia failed to receive assurance of German neutrality, the old coalition of the Seven Years' War—the alliance, that is, of Austria, Russia, and France against Prussia—might be revived. "If Germany possesses the advantage," he said, "of having no direct interests at stake in the East, she labors on the other hand under the disadvantage of an exposed position in the heart of Europe, with an extended frontier, which has to be defended on every side, and surrounded by enemies ready to enter into alliance against her. At the same time, Germany is, perhaps, the only great Power in Europe which is not tempted by objects unattainable except through war. It is our interest to maintain peace, while our Continental neighbors, without exception, foster ambitions, either secret or officially avowed, which can be realized only by war. We must direct our policy in accordance with these facts—that is, we must do our best to prevent war, or at least to restrict it." Bismarck's largeness of view and freedom from petty enmity is shown by his efforts, as soon as Austria had been beaten at Sadowa, to establish friendly relations between that Power and Germany. A man of strong passions, he allowed no prejudice to blind him to the requirements of sound national policy.

His attachment to Emperor William I. was in every way creditable to him. After the death of the Emperor in 1888, Bismarck remained in office during the brief reign of his successor, the Emperor Frederick.

William II. had learned his statecraft in the school of Bismarck, but it was inevitable that the autocratic young Emperor should come into collision with the strong-willed minister who had been so long accustomed to the personal direction of Prussian and German affairs. Numerous quarrels finally led to the resignation of Bismarck, which occurred on March 20, 1890. He retired to Friedrichsruh. On leaving office the title of Duke of Lauenburg was bestowed upon him by the Emperor, together with one of the highest military ranks (Generaloberst of cavalry). The open estrangement between the two continued until after Bismarck's severe illness in 1893, when the Emperor made advances toward a reconciliation, which took place in form at least. Bismarck's eightieth birthday (April 1, 1895) was made the occasion of a great demonstration throughout Germany. He was visited by the Emperor and by thousands of military and political associates, and a Bismarck Museum was founded in Berlin.

So positive a force in the life of his day necessarily aroused both intense admiration and bitter

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hostility. He was, beyond question, the greatest European statesman of the century, and one of the greatest statesmen of all time. His genius was of the rare constructive type, and he is justly included in the trio of creators of modern Germany, together with the Great Elector Frederick William and Frederick the Great. He had set himself a great end, the realization of a united Germany and the fullest development of the German nation; he pursued it relentlessly, and he achieved it by methods at least as unimpugnable as those applied to any similar task in history. Against his critics he could set up the worldly but weighty defense of success. He found Germany a group of jealous kingdoms and principalities, the shuttlecock of Austria and France. He left it a united nation, one of the world's great Powers, and the dominant force on the Continent of Europe. In his *Gedanken und Erinnerungen*, the work of his years of retirement, commonly though somewhat inaccurately called, in its English translation, "Bismarck's Autobiography," he has left a valuable epitome of his views on many points of European policy. In this and in his collected speeches, letters, and papers must be sought his *Apologia*. In private life Bismarck was a kind husband and father, a genial friend, and a considerate landlord. Physically and mentally, he was a man of surpassing power and endurance, and his capacity for work, creative or absorptive, was tremendous. Though not a scholar in the strict sense of the word, he was a man of wide information, always accessible to his ready memory. While not a finished orator, the pungency of his speech and the aptness of his quotations from history and literature always held his audience in the Reichstag. He died July 30, 1898. For his own epitaph he wrote simply, after his name and the dates of his birth and death, "a faithful German servant of the Emperor William I." He had three children—Countess Marie, born August 28, 1848; Prince Herbert, born December 28, 1849; and Count Wilhelm, born August 1, 1852, and died in 1901.

BIBLIOGRAPHY. *Bismarck, the Man and the Statesman; being the reflections and reminiscences of Otto, Prince von Bismarck, written and dictated by himself after his retirement from office*, 2 vols., translated by Butler, popularly known as Bismarck's Autobiography (New York, 1899); Busch, *Bismarck: Some Secret Pages of His History*, 2 vols. (New York, 1899); Bismarck, *Gesammelte Werke*, 5 vols. (Berlin, 1892); and id. *Politische Reden*, ed. von Kohl, 9 vols. (Stuttgart, 1892-94); Blum, *Das deutsche Reich zur Zeit Bismarcks* (Leipzig and Vienna, 1893); Sybel, *The Founding of the German Empire*, 7 vols. trans. (New York, 1898); Tuttle, *Brief Biographies: German Political Leaders* (New York, 1876); Lowe, *Prince Bismarck* (London, 1885); Dawson, *Bismarck and State Socialism* (London, 1890); Munroe-Smith, *Bismarck and German Unity* (New York, 1898); Klaczko, *The Two Chancellors—Gortchakoff and Bismarck* (London, 1876); Oncken, *Das Zeitalter Wilhelms I.* (Berlin, 1890).

BISMARCK-SCHÖNHAUSEN, WILHELM ALBRECHT OTTO, Count von (1852-1901). A German statesman, second son of Prince Otto von Bismarck, born at Frankfort-on-the-Main. He was educated at the University of Bonn, and served in the Franco-Prussian War as an officer of ordnance. He was attached to the Imperial Chancellery from 1878 to the fall of 1879, when he was transferred to Alsace-Lorraine as assistant to the Governor. He again served in the Imperial Chancellery from 1881 to 1884, and was later successively appointed President of the Province of Hanover (1889) and Governor of East Prussia.

BISMUTH, bĭz'mŭth (Fr. *bismuth*, Ger. *Bismuth, Wismuth*, of unknown origin). A metallic element, probably known to the ancients, but first described in 1450. In the native state it is found widely distributed in small quantities, generally with ores of copper, lead, etc. It is further found in combination with oxygen as *bismite*, with sulphur as *bismuthinite*, with carbonic acid as *bismutite*, and as an alloy with tellurium, called *tetradymite*. These various minerals are widely distributed; but the principal commercial source is the metallic bismuth which is found in association with other ores, in the mines of Saxony and Bohemia, and at Monroe, Conn., in the United States. The commercial metal is obtained chiefly from the reduction-works in Saxony, although a small quantity is smelted in England. The process by which the metal is obtained consists in first carefully hand-picking the ore, after which the selected pieces are roasted and the metal run off from the gangue into pots. By remelting at as low a temperature as possible, with one-tenth of its weight of nitre, a solid slag is formed by the nitre on the surface, with practically pure metal beneath. Bismuth (symbol, Bi; atomic weight, 208.5) is a brittle, grayish-white, crystalline metal of a distinctly red tinge, with a specific gravity of 0.98. It melts at 268.3° C., and boils between 1090° and 1450° C. It is a poor conductor of heat and electricity. The metal itself is used chiefly as a constituent of alloys and amalgams. With lead, tin, and cadmium it forms a fusible metal, which melts at from 16° C. to 34.5° C., according to the proportion of its constituents. These alloys, besides having a remarkably low melting-point, expand in the act of solidification, thus giving a perfect cast. Small quantities have been used in the manufacture of bell-metal. Bismuth combines with radicals to form diad, triad, and pentad salts, of which the trivalent compounds are the most stable. Its principal compound with oxygen is the trioxide, which is found native as the mineral bismite, and may be prepared artificially by igniting the bismuth subnitrate until red fumes cease to come off. It is a pale-yellow amorphous compound, used for glass and porcelain staining, as an addition to certain fluxes to prevent the production of color, and in gilding porcelain. Its most important compound is the nitrate, which may be made by dissolving metallic bismuth, or its oxide, or carbonate, in nitric acid, yielding a pearly-white powder consisting of minute scales, which is used as a flux for certain enamels, owing to the fact that it increases their fusibility, as a colorless iridescent glaze on porcelain, and as a cosmetic for softening the skin, under the names of *blanc de fard* and *blanc d'Espagne*. It is an official medicine, and was formerly termed *majestery of bismuth*, being largely used in chronic diarrhœa and cholera. Bismuth oxychloride, prepared by treating a solution of the normal nitrate with a dilute solution of common salt, yields a precipitate which is a white pearly

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powder that is used as a cosmetic under the name of *pearl-white*, and also as a pigment. Bismuth citrate, bismuth carbonate, and bismuth and ammonium citrate are official medicines, and are used chiefly as astringents.

BIS'MUTHINITE. A bismuth trisulphide that crystallizes in the orthorhombic system. It is of a lead-gray color, and usually occurs massive with a foliated or fibrous structure, although sometimes it is found crystalline. The principal localities where this mineral occurs are various places in Cumberland, England; at Meymac, France; in Sweden; in Bolivia, South America; also in Beaver County, Utah, and in Fresno and Mono counties, Cal. It has some value as an ore of bismuth.

BISON (Lat., Gk. *βίσων, bisōn*, wild ox; cf. OHG. *Wisunt, Wisant*, Ger. *Wisent*, bison, AS. *Wesend*, wild ox). A kind of wild cattle, characterized by massive and shaggy fore quarters. The name was applied by Pliny and subsequent Latin writers to a wild ox of Europe otherwise called *bonasus*, and probably the aurochs. More recently the term has been properly extended to the American 'buffaloes,' and erroneously to the East Indian gaurs. Zoölogically, the word is the name of a bovine genus, including the aurochs (*Bison bonasus*), the American bison (*Bison Americanus*), and several extinct species of both continents.

Bisons differ from other oxen in the excessive development of their fore quarters, where the line of the back arches over the withers in a hump formed by the long dorsal spines that give attachment to the very thick and strong muscles needed to support the massive head; also in their more slender limb-bones and ribs (which number 14 instead of 13), in the breadth and convexity of the front of the skull, where the horns spring from below the top line of the forehead, and in their six, instead of four, nasal bones. "Externally, they differ in having the head heavily clothed with long, bushy hair; they also possess a heavy barb, and the fore legs are heavily fringed with coarse, long hair. The clothing-hair of the body also differs from that of representatives of the restricted genus Bos and most of its allies in consisting mainly of short, curled, crisp wool in place of straight hairs. . . . Their nearest ally is probably the yak." (*Allen.*) The females are smaller, less massive and shaggy in the fore quarters than the bulls, and with lighter horns. The two existing species will be treated of below. Three fossil species are recognized by J. A. Allen in his classic monograph, *The American Bisons* (Cambridge, 1876). One is *Bison priscus*, a very large, long-horned species, widely distributed in the Pleistocene formations of Europe. Another, named *Bison antiquus*, is found fossil in northern America, and is so closely similar that Allen thinks the two might have been local races of a then circumpolar species. Both of these are regarded by some naturalists as direct ancestors of the modern forms. The third is *Bison latifrons*, a more ancient type (yet belonging to the era preceding the present), which was of gigantic size, with horns that must have spread ten or twelve feet—three to four times that of any other species.

THE AUROCHS, bonasus, or zubr, has the general form of this type, and an old male stands about six feet high. The color is brown, much darker in the long hair of the fore parts than in the short wool of the sides and flanks. The horns are about 18 inches long, tapering, spreading, and a little curved inward at the point, and the tail is long and heavily tufted. Once widely distributed over Continental Europe and Trans-Caucasia (avoiding the Russian steppes), it would long ago have become extinct were it not that guarded bands, numbering in 1898 about 700 individuals, have been protected in the Imperial forest preserves of Bialowicza in Lithuania, while a few hundred more roam semi-wild in the fastnesses of the Caucasus. It has never been really domesticated, though several experimental crossings have been made between it and tame cattle, the results of which have not been important. It is said to exhibit aversion to association with other cattle, and to retain its ancestral wildness and shyness with great tenacity. It moves about in small bands, which are easily provoked to anger, and become dangerous by the swiftness of their movements and the overpowering force of their weight in a charge. Its food consists of grass and brushwood, and the leaves and bark of young trees. Its cry is peculiar, "resembling a groan or grunt more than the lowing of an ox." It does not attain its full stature till after its sixth year, and lives for about thirty or forty years.

THE AMERICAN BISON, more familiarly known as the 'buffalo,' is a slightly smaller, less massive animal than the aurochs, with more slender hind quarters, a shorter tail, and somewhat shorter and more robust horns, but with a higher hump and greater shagginess about the head and shoulders. The females are greatly inferior to the males in bulk, Audubon giving the weight of an old bull as nearly 2000 pounds, while full-grown, fat females will weigh only 1200 pounds. In habits it differs broadly from the aurochs in being highly gregarious, the nature of the country permitting it to gather into enormous herds, and in being almost exclusively a grazer.

"The habitat of the bison," according to Allen, "formerly extended from the Great Slave Lake on the north, in latitude about 62°, to the northeastern provinces of Mexico, as far south as latitude 25°. Its range in British North America extended from the Rocky Mountains on the west to the wooded highlands about 600 miles west of Hudson's Bay, or about to a line running southeastward from Great Slave Lake to the Lake of the Woods. Its range in the United States formerly embraced a considerable area west of the Rocky Mountains, its recent remains having been found in Oregon as far west as the Blue Mountains, and farther south it occupied the Great Salt Lake basin, extending westward even to the Sierra Nevada Mountains, while less than fifty years ago (i.e. until about 1830) it existed over the headwaters of the Green and Grand rivers, and other sources of the Colorado. East of the Rocky Mountains its range extended southward far beyond the Rio Grande, and eastward throughout the region drained by the Ohio River and its tributaries. Its northern limit, east of the Mississippi, was the Great Lakes, along which it extended eastward to near the eastern end of Lake Erie. It appears not to have occurred south of the Tennessee River, and only to a limited extent east of the Alleghanies,

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chiefly in the upper districts of North and South Carolina."

Restriction of range and decrease in numbers quickly followed the settlement of the interior. By 1800 it had disappeared east of the Mississippi; by 1850 it had been confined to the region of the dry plains; by 1875 it had been swept away from the central plains and limited to the region of northwestern Texas and western Kansas in the south, and in the north to Montana and northward, where isolated herds survived, with rapid diminution, until 1888, when the last remnant of the southern herd was nearly extinguished in the 'Panhandle' of Texas, by the capture of the last specimens by C. J. Jones (consult Inman, *Buffalo Jones: Forty Years of Adventure*, Topeka, 1899). Small scattered bands remained a few years longer in isolated retreats, but the end of the century saw none in freedom south of the North Saskatchewan. There, the extensive and lonely forests south of Great Slave Lake are still tenanted, sparingly, by the forest-ranging, larger and darker variety known as the Wood-Buffalo (subspecies *Athabascæ*), which is steadily being reduced by the Indians in spite of the efforts of Canadian officials. A few hundred also survive under legal protection in the Yellowstone National Park, on the Flathead Reservation in western Montana, and in various parks and zoölogical gardens in the United States and Europe—probably not more than 500 in all. This is the result of a century of unexampled waste of one of the most numerous, interesting, and valuable animals in the world, and it is an irretrievable national disgrace. For full particulars, consult Allen's *Monograph*, heretofore cited, and W. T. Hornaday's "Extermination of the American Bison," in the *Annual Report of the Smithsonian Institution for 1887*.

The American bison was preëminently gregarious, and on the Western prairies and plains assembled in herds of thousands and even millions of individuals. So numerous were they that the early travelers on the plains might travel for days without losing sight of them; wagon-trains, and even the first railroad trains, were sometimes compelled to stop and wait for their passage; and the present writer has seen steamboats halted by herds swimming the Upper Missouri. These vast herds were made up of coherent bands, which had the habit of marching in files, and the paths thus made, called 'buffalo-trails,' are still traceable on the arid plains; also the circular 'wallows' where they rolled and spun in taking a dust-bath. Each band was accompanied by bulls which, when alarmed, formed a defensive circle, with lowered heads, about the cows and calves, to protect them from the attacks of the bands of wolves that followed the herds, preying upon the weaklings, or from onslaughts by a puma or a bear; the grizzly alone was able sometimes to vanquish a buffalo in single combat. During the midsummer rutting season the bulls were constantly fighting with one another also. The sexes remained together throughout the year, with the exception of an occasional solitary and morose bull. A single calf was the rule, born in spring, after a gestation of about nine months. The molting of the winter's woolly undercoat occurred early in summer, the hair coming off in great flakes; and the hide was in good condition for robes from October till May.

The buffaloes were nomadic, wandering in search of pasturage, and certain annual migratory movements took place under the influence of regional or seasonal changes in forage or weather. In such movements they swam large rivers fearlessly, and climbed mountains or made their way over rough ground with amazing agility. As a rule, however, they chose the easiest routes, and their trails were excellent guides to both travelers and engineers. One great defect in their character was their liability to panic, when the whole herd would rush headlong into a bog or over a precipice, taking no heed of the fate of those in front.

The Indians of the open interior region subsisted mainly upon the buffalo, and were able to retain their independence as long as it was numerous. The flesh was excellent beef, and was sun-dried in vast quantities for transportation; and the hides served as material for lodges, winter clothing, harness, boats (in the form of coracles on the Missouri), shields, etc. Various uses were found for the sinews, bones, and horns, while the dung or 'chips' formed the fuel of the plains. The Indians hunted it in companies, usually mounted, but sometimes on foot, or on snow-shoes, when various stratagems were employed to aid them. The simple chase on horseback was most exciting and perilous. When large amounts of meat were desired for winter stores, or for making pemmican, pounds were constructed, with guiding fences. At the entrance to the trap or inclosure a sudden pitch, natural or dug, would compel the animals to leap down, whence they could not return and could easily be slaughtered. This was feasible only in a somewhat wooded region. Another method was for a party of men to ride round and round a herd until they were crowded into a bewildered, stationary mass, and then kill them at leisure. White men at first hunted the buffalo for food, and thousands were recklessly killed for the sake of a single slice from the hump or a tongue. Their hides early became an article of commerce, and the Indians were encouraged to procure them for the traders. To this there was added, from about 1860 onward, an army of white hide-hunters, who made a business of following and ruthlessly slaughtering the animals, and succeeded so well that careful estimates show that on the average 2,000,000 hides a year were sent to market between the years 1865 and 1875. For these they received on the average no more than $1, out of which sundry expenses must be paid. Subsequently, as the product diminished, prices rose, but never very greatly, and robes continued to sell up to 1890, in Eastern cities, for from $15 to $40, and the few remaining are not greatly advanced in price.

A great number of poor hides were tanned for leather, but it was porous and of no great value. The coarse fleece has been spun, and small quantities of it have been made into a soft cloth used for gloves, etc.—a service certain Indians found for it prehistorically. The early settlers in the Mississippi Valley looked upon the buffalo as likely to prove domesticable and of great service; but although easily subjugated when taken young, it has not proved docile and of practical use, nor have the hybrids frequently produced between it and domestic cattle shown such qualities as make them desirable.

Compare BUFFALO; and Plate of WILD CATTLE.

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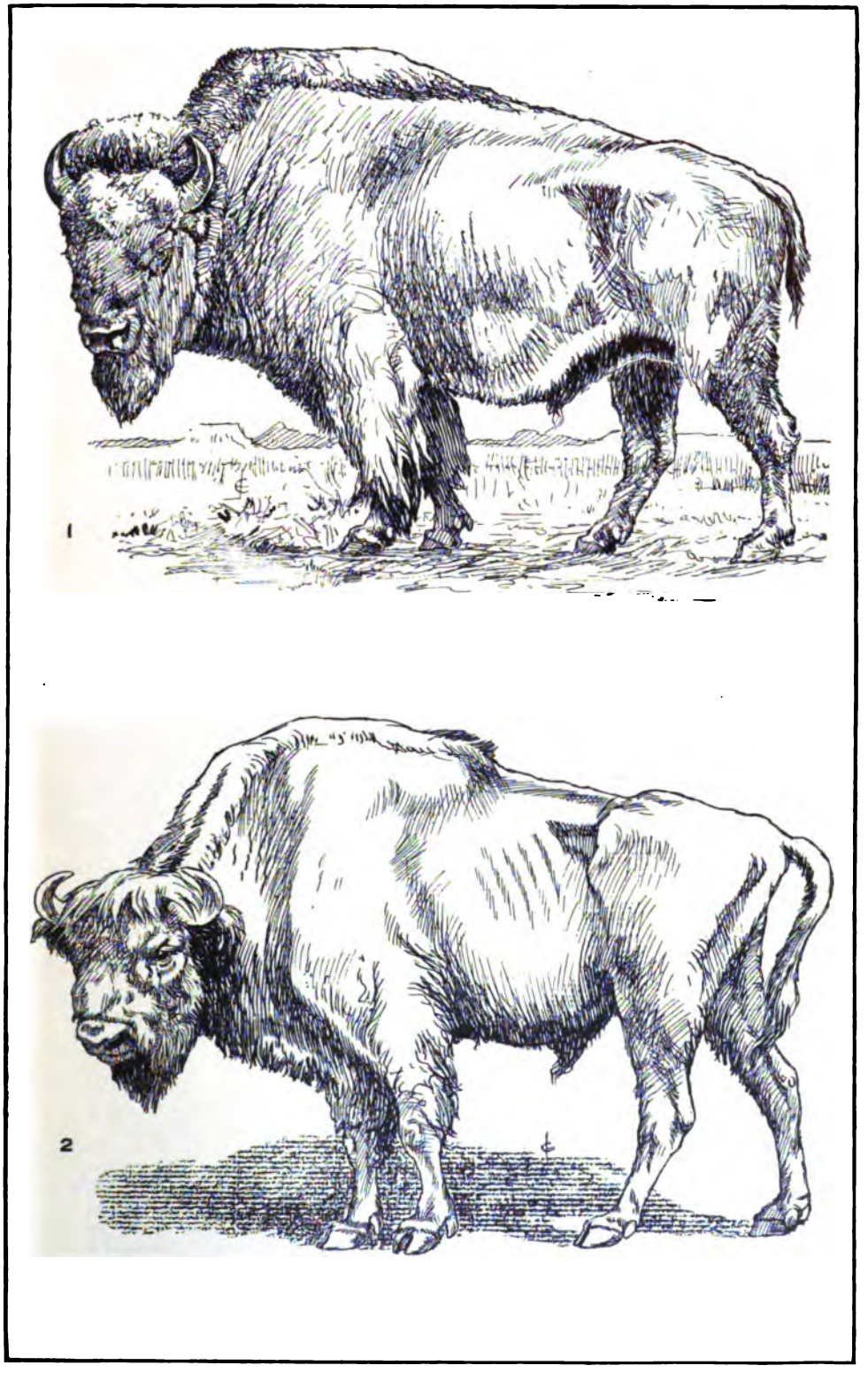
BISONS



1. AMERICAN BISON or BUFFALO (Bison americanus). 2. EUROPEAN BISON or AUROCHS (Bison bonasus).

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BISPHAM, bĭs'pam, DAVID (1857—). An American singer, born in Philadelphia, Pa., and educated at Haverford College. He studied in Florence under Vannuccini, and in London under William Shakespeare, and in 1891 made his professional début at the Royal English Opera, London, as the Duc de Longueville in *La Basoche.* Since 1892 he has sung in Italian, German, and English, as the principal barytone of the Royal Opera, Covent Garden, London. At the Metropolitan Opera-House, in New York City, he has appeared as the chief Wagnerian barytone. He has also sung much and most successfully in concerts.

BISSAGOS, bĭs-sä'gōz, or **BIJU'GA ISLANDS** (from a negro tribe *Bujago,* or *Bijuga,* inhabiting several of the islands). A group of small volcanic islands, off the west coast of Africa, in latitude 11° N. and longitude 16° W., opposite the mouth of the Rio Grande. About half of the islands are inhabited by negroes under the immediate dominion of native chiefs. The climate is unhealthy, but the vegetation is rich. Orange is the largest island. The chief town, Bulama, is situated on the island of the same name, and has a population of over 3700. The group forms a dependency of Portuguese Guinea (Map: Africa, C 3).

BISSAO, bēs-sä'ō, or **BISSEO,** -sā'ō. The chief port of Portuguese Guinea (q.v.).

BISSCHOP, bĭs'kŏp, CHRISTOFFEL (1828—). A Dutch painter, born at Leeuwarden (Friesland). He was a pupil of Schmidt in Delft, and of Gleyre and Comte in Paris. His works derive their material chiefly from Friesland, and are particularly successful in the treatment of interior light effects. His method is not unlike that of Rembrandt and other Seventeenth-Century Dutch masters. Among his paintings are: "The Dealer in Curiosities," "Winter in Friesland," and "The Morning Sun." He was elected to the Academy of The Hague.

BIS'SELL, EDWIN CONE (1832-94). An American biblical scholar. He was born at Schoharie, N. Y., March 2, 1832, and graduated at Amherst College (1855), and at Union Theological Seminary (1859). He served as a Congregational pastor at Westhampton, Mass., San Francisco, Cal., Winchester, Mass., and was a foreign missionary of the American Board of Commissioners for Foreign Missions at Innsbruck, Austria (1874-79). In 1881 he became professor of Hebrew in the Hartford Congregational Theological Seminary, whence he passed in the same capacity to the McCormick Presbyterian Theological Seminary in 1892. He died in Chicago, April 9, 1894. He was captain of Company H, Fifty-second Massachusetts Volunteer Regiment (1862-63), while still pastor of Westhampton, and stated supply at Honolulu, Oahu, 1869-70. He was a conservative biblical scholar, but not reactionary, and produced several still valuable works: *The Historic Origin of the Bible* (1873); *The Pentateuch: Its Origin and Structure; An Examination of Recent Theories* (1885); *Biblical Antiquities* (1888, 2d ed., 1892); *A Practical Introductory Hebrew Grammar* (1891); *Genesis, Printed in Colors, Showing the Original Sources from which it is Supposed to have been Compiled, with an Introduction* (1892). But his best and most original work was his volume on *The Apocrypha of the Old Testament, with Historical Introductions; A Revised Translation, and Notes Critical and Explanatory* (1880), which Dr. Schaff incorporated in his edition and translation of *Lange's Commentary.*

BISSELL, WILSON SHANNON (1847—). An American lawyer. He was born in New London, Oneida County, N. Y., graduated at Yale, studied law in Buffalo, and in 1872 began practice with a law firm to which, in the year following, Grover Cleveland was admitted. On the election of Cleveland as Governor of New York, Bissell became the senior partner of a newly organized firm, and gradually confined his legal practice to the special line of counsel for corporations. From 1893 to 1895, during Cleveland's second administration as President, Bissell was Postmaster-General of the United States.

BIS'SEN, HERMANN WILHELM (1798-1868). A Danish sculptor. He was born in Schleswig, October 13, 1798, and studied first in Copenhagen, where in later years (1850) he was made director of the Academy of Arts. In 1823 he took the great gold medal and was sent to Rome to work under Thorwaldsen, with whom he studied ten years. After returning to Denmark he executed a number of excellent works, among them a bust of Oersted, "Atalanta Hunting," etc. In 1841 he returned to Rome to complete for the Government eighteen statues. He has left numerous examples of his work. Among his masterpieces are the "Valkyrie," "Cupid Sharpening His Arrows," and "Moses." A frieze, 134 feet long, was burned in Copenhagen in 1884. By the will of Thorwaldsen he was commissioned to complete that master's work. Bissen died in Copenhagen March 10, 1868.

BISSEX'TILE (Lat. *bissextilis*). The old name of leap-year. In the Julian computation a day was added to February every fourth year; but instead of making it, as now, the 29th, the 24th day of the month was counted twice (*bis*), and as that day was the sixth (*sextus*) before the calends of March, it was called *bis-sextilis.* See CALENDAR; DATE.

BISTINEAU, bĭs'tē-nō'. A lake in the northwestern part of Louisiana, about 25 miles southeast of Shreveport; it is about 25 miles long and has an average width of about two miles. It receives a number of streams, mainly from the north, and discharges its water through the Red River, with which it is connected by a short river. It is navigable for river steamboats.

BIS'TORT (Lat. *bis,* twice + *tortus,* twisted; referring to its root)—*Polygonum bistorta.* A perennial plant, 1 to 1½ feet high, with a simple stem, ovate subcordate and wavy leaves, the radical leaves tapering into a long petiole, and one dense terminal cylindrical spiked raceme of flesh-colored flowers. The root is about the thickness of the little finger, blackish-brown externally, reddish within, and tortuous (whence the name bistort). The whole plant is astringent, containing much tannin. Bistort is a native of Europe and Asia. It is found in Great Britain, but is by no means common.

BISTRE, bĭs'tēr (Fr. *bistre,* dark brown). A blackish-brown color, often made of moistened soot mixed with a little gum. Chinese ink, or India ink, has largely replaced bistre in water-colors.

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BIS'TRITZ (Slav. *bystrŭ*, swift). A river rising in the Carpathian Mountains in eastern Hungary, flowing southeast through Bukowina and Moldavia, and joining the Sereth just below Bakau, after a course of about 185 miles. It is called the Golden Bistritz, on account of the auriferous character of its sands.

BISTRITZ (Hung. *Beszterce*). A royal free town of Transylvania, Kingdom of Hungary, beautifully situated on the Bistritz River (an affluent of the Szamos), in a fine valley about 74 miles northeast of Klausenburg (Map: Austria, J 3). It was formerly strongly fortified, and remains of its ancient walls and gates are still standing. Near the town are the ruins of a castle once the residence of the famous John Hunyady. Population, in 1890, 9109, mostly Germans. In 1848-49 Bistritz was the scene of fierce fighting between the Austrians and the Hungarians.

BITHOOR'. See BITHUR.

BITHUR, bē-thōōr'. A town of India, in the Cawnpore District, Northwest Provinces, on the right bank of the Ganges, 12 miles northwest of Cawnpore. It is particularly devoted to the worship of Brahma, has numerous pagodas and elaborate ghats, and is a favorite pilgrim resort for purposes of ablution. During the Mutiny of 1857, Bithur was the stronghold of Nana Sahib. Here Havelock more than once exacted retribution, defeating the Nana in the field, and burning his fort. Population, about 6000.

BITHYNIA, bĭ-thĭn'ĭ-ȧ (Gk. Βιθυνία). An ancient division of Asia Minor, separated from Europe by the Propontis (Sea of Marmora) and the Thracian Bosporus (Strait of Constantinople). It was bounded north by the Euxine, south by Galatia, Phrygia, and Mysia, and east by Paphlagonia. It contained the famous Greek colonies of Chalcedon and Heraclea; at a later period, Nicomedia, Nicæa, and Prusa were the chief cities. The inhabitants of Bithynia were supposed to be of Thracian origin. The country was subdued by Crœsus of Lydia, and later fell under the Persian dominion, though the native princes seem to have been left in power. In the confusion which followed the death of Alexander, the native dynasty secured an independent position, and in B.C. 297 Zipoites seems to have assumed the title of king. His son Nicomedes I. founded in B.C. 264 the city of Nicomedia, which became the capital. Prusa was founded about B.C. 185 by King Prusias I., and was for a time the chief city. The last king, Nicomedes III., made the Romans his heirs, and with a large addition from the Pontic kingdom, Bithynia became a province of the Republic (B.C. 74). Under Trajan, Bithynia was governed by Pliny the Younger, whose letters to the Emperor on the administration and condition of the province contain the well-known passage respecting the Christians. The Emperor Diocletian made Nicomedia his habitual residence. In 1298 Osman the Turk broke into the country, and in 1328 Prusa or Brusa, then the chief town of Bithynia, became the capital of the kingdom of the Osmanli, and in its mosque are the tombs of the earliest Sultans. Consult Ramsay, *Historical Geography of Asia Minor* (London, 1890).

BITING LICE, or **BIRD-LICE**. A group (Mallophaga) of wingless lice, which infest birds and mammals, each of the thousand or more species, as a rule, belonging to only one kind of host, and having mandibulate mouth-parts adapted to cutting and biting, instead of suctorial organs.

BITLIS, bĭt-lēs'. A town of Asiatic Turkey, capital of the vilayet and sanjak of the same name. It is situated at an elevation of 5156 feet above the level of the sea, in a deep ravine traversed by the river Bitlis, near Lake Van (Map: Turkey in Asia, K 3). Bitlis is a scattered and irregularly built place, with a large number of mosques, convents, several well-stocked bazars, a palace, and ruins of an old fortress. The chief products are cotton fabrics, arms, and silver and gold articles. It exports some raw wool and tobacco, and imports cotton for its manufactures, chiefly from Persia. It has also a very extensive trade. The import of British goods is small. The population is about 39,000, including a considerable number of Armenians. The Persians defeated Solyman the Magnificent near Bitlis in 1554.

BITONTO, bē-tōn'tō (anciently, Lat. *Butuntum*). A city in south Italy, 5 miles from the Adriatic, and 10 miles west of Bari (Map: Italy, L 6). It has a Romanesque cathedral, a theological seminary, an orphan asylum, and a castle. The chief trade is in salad-oil and in a wine called Zagarello. In its vicinity the Spaniards, under Count de Montemar, gained a victory over the Austrians in 1734, which gave Naples to Don Carlos. Population, in 1881, 23,812; in 1901 (commune), 30,617.

BITSCH, Fr. **BITCHE** (anciently *Bytis castrume*). A German town of Alsace-Lorraine, on the Horn, in a wild and wooded pass of the Vosges, 36 miles north-northeast of Strassburg. Its citadel, built on a precipitous and isolated rock, in the middle of the town, is well supplied with water, defended by 80 cannon, has accommodations for a garrison of 1000 men, and is considered all but impregnable. The Prussians under the Duke of Brunswick attempted to surprise it in 1793, but failed. It was also unsuccessfully besieged by the Germans in 1870. The town has manufactures of matches, watch-glasses, and porcelain. Population, in 1900, 3600 (Map: Germany, B 4).

BITTENFELD, bĭt'ten-fĕlt, HERWARTH VON. See HERWARTH VON BITTENFELD.

BIT'TER, KARL HERMANN (1813-85). A Prussian statesman and writer on music. He was born at Schwedt, Province of Brandenburg, and studied law and cameralistics at Berlin and Bonn. He served as the plenipotentiary of Prussia on the Danube Commission from 1856 to 1860, was prefect of the Department of Vosges during the Franco-Prussian War, and subsequently became minister of finance (1879)—an office in which he displayed exceptional ability. He increased the indirect duties derived from the so-called tobacco monopoly and the tax on spirits and malt, introduced the 'Börsensteuer' (tax on the bourse), and concluded the commercial treaty with the city of Hamburg by which that city entered the German Customs Union. He reëstablished the stability of the Prussian finances, and took a prominent part in bringing the railroads of Germany under Government control. He resigned in 1882, in consequence of differences with Bismarck. His lit-

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erary activity was confined almost exclusively to works on music.

BITTER ASH. See QUASSIA.

BITTERFELD, bit'tĕr-fĕlt. A town in the Prussian Province of Saxony, about 20 miles north of Leipzig, on the Mulde (Map: Prussia, E 3). It has foundries and breweries, and among its various manufactures may be mentioned organ-pipes and volatile oils. Bitterfeld was founded in the Twelfth Century by the Flemings. Population, in 1890, 9047; in 1900, 11,840.

BITTERN (OE. *bitoure*, bitter, from Fr. *butor;* origin uncertain). Any heron of the genus Botaurus and related genera, forming the separate sub-family Botaurinæ. Bitterns are chiefly distinguished from herons by the long, loose plumage of the sides of the neck, which they have the power of erecting at pleasure, along with the rest of their clothing feathers, so as greatly to increase their apparent size. Bitterns also differ from herons in the greater length of their toes, the middle toe being as long as the shank; in the presence of only two pairs of powder-tracts, and in having only ten tail-feathers. They are almost all solitary birds, inhabiting reedy and marshy places, where they remain during the day, and will almost allow themselves to be trodden upon before taking wing; they feed during the night on frogs, and partly, also, on fish, lizards, water-insects, etc., and even small birds and quadrupeds. The claw of the middle toe is serrated on the inner edge, probably to aid in securing slippery prey. The common bittern of America (*Botaurus lentiginosus*) is a bird very widely diffused over the whole continent of North America. In size it varies greatly, from 2 to 3 feet in length, and with an expanse of wing up to nearly 4 feet; the bill is about 3 inches long. The feathers on the crown of the head are dull-brown, and the plumage in general of a dull tawny color, beautifully and irregularly marked and mottled with black and white. The bittern makes a rude nest of sticks, reeds, etc., in its marshy haunts, and lays four or five eggs (illustrated in the Plate of EGGS OF WATER AND GAME BIRDS). It has a peculiar bellowing cry, which has obtained for it such names as stake-driver, bull of the bog, etc., and many of its appellations in other languages, perhaps even its name bittern (*bitour, botur, botaurus*). Some naturalists used to assert that the booming cry of the bittern was produced by the bird inserting its bill into a reed or into the mud, but that notion has long since been exploded.

This bird's spring notes are, however, very remarkable, making a booming which has been aptly compared to the noise made by an old wooden pump-handle. Said Thoreau (*Journals*, June 20, 1852): "The stake-driver is at it in his favorite meadow. I followed the sound, and . . . heard some lower sounds at the beginning, like striking on a stump or stake, a dry, hard sound, and then followed the gurgling, pumping notes fit to come from a meadow. . . . It sounds more like wood-chopping or pumping because you seem to hear the echo of the stroke or the reverse motion of the pump-handle. After the warm weather has come both morning and evening you hear the bittern pumping in the fens." Watters (*Birds of Ireland*) says of the British bittern: "Remarked, during the breeding season, for its peculiar spiral flight in the air, it is to this it is indebted for the beautiful poetic name bestowed upon it by the Latins, 'Cheron of the Stars' or 'star-mounter,' an idea as quaint in its beauty as is the German 'Earth-spurner' for the skylark." When assailed, it fights desperately with bill and claws; and it is dangerous to approach it incautiously when wounded, as it strikes with its long, sharp bill, if possible, at the eye. The bittern of Europe (*Botaurus stellaris*) is very similar to that of America, but differs in having the crown black and in some other details of color; the eggs also are different, being greenish-brown. It is a common bird throughout Europe, Asia, and Africa. The Australian species (*Botaurus Australis*) is generally diffused throughout Australia, wherever marshes or sedgy rivers occur. In habits it closely resembles the bittern of Europe. The head and upper parts generally are purplish-brown, except the wings, which are buff, conspicuously freckled with brown; the throat, breast, and belly mottled brown and buff.

Least Bittern.—Nearly allied to the bitterns are birds of the genus Ardetta, commonly known as 'least bitterns.' So similar are they to Botaurus that they are included in that genus by many of the best ornithologists. They are much more highly colored and are only about a foot in length. They are found in North America and Europe, but are rarely seen because of their retiring habits, and the fact that they live in reedy swamps, where they are easily hidden. The most common North American species is *Ardetta exilis.*

BITTERN, BITTER LIQUID, or SALT OIL. An oily liquid, obtained in salt manufacture, left when the mother-liquor of the evaporating-pans ceases to deposit crystals of common salt. It consists principally of a strong solution of common salt, along with the chlorides of magnesium and calcium, and bromide of potassium. The bittern obtained from the salt-works of Epsom was at one time the source of the sulphate of magnesium (hence called Epsom salts). Bittern is also a valuable source of the element bromine, the extraction of which is usually effected by electrolytic methods. See SALT; BROMINE.

BITTERNUT. See HICKORY.

BITTERS. A term applied in popular speech to beverages containing alcohol and either aloes for a cathartic effect, or Angostura bark, gentian, calisaya, etc., for stimulating the appetite and digestion. Medically, bitters are mild tonic or pungent aromatic stimulants, to be used in improving digestive conditions. The 'simple bitters' include quassia, gentian, calumba eupatorium (boneset), etc.; the 'aromatic bitters' include chamomile, cascarilla, angostura, and cimicifuga (snakeroot); the 'peculiar bitters' include wild cherry, cinchona, and picric acid.

BITTER SPAR (Ger. *Bitterspat*). A name given by the Germans to the mineral dolomite, owing to the magnesia which it contains, salts of magnesia having a bitter taste.

BITTERSWEET, DULCAMARA, or WOODY NIGHTSHADE (*Solanum dulcamara*). A plant found in hedges and thickets in most parts of Europe and in Asia, and introduced in the United States. The root is perennial; the stem climbing and shrubby, many feet in length; the leaves ovate-heart-shaped, the upper ones spear-shaped;

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the flowers, purple or blue, in drooping cymes, much resembling those of its congener the potato, but much smaller, followed by ovate red berries of tempting appearance, are not unfrequently the cause of serious accident, particularly to children. The twigs are collected in autumn after the leaves are fallen. The fluid extract prepared from the twigs possesses the power of blunting to some extent sensibility to pain, and of considerably increasing the secretions of the skin, the kidneys, etc. The extract is employed in medicine chiefly as a remedy for scaly eruptions on the skin. Its principal chemical constituents are resin, gum, the alkaloid solantine, and the glucoside dulcamarin. *Celastrus scandens*, a woody vine, is also called bittersweet in the United States. See SOLANUM.

BITTER-SWEET. A poem of New England by J. G. Holland (1858).

BITTER VETCH. See OROBUS.

BITTERWOOD. A name given to certain species of the genus Xylopia, trees and shrubs remarkable for the bitterness of their wood, particularly the West Indian *Xylopia glabra*. Furniture made of this wood is safe from the attacks of insects. The genus Xylopia belongs to the natural order Anonaceæ. The fruit of some of the species, particularly *Xylopia sericea*, is highly aromatic and pungent like pepper. Xylopia sericea is a large tree, a native of Brazil; its bark is used for making excellent cordage.

Bitterwood is also the name of *Quassia excelsa* or *Simaruba excelsa*, a tree of the natural order Simarubaceæ, a native of Jamaica, the wood of which is used in medicine. Botanically, it is very nearly allied to the true quassia, and possesses very similar properties, containing the crystallizable bitter principle called quassin. The wood, which is intensely bitter, is a very useful stomachic and tonic; if introduced by the rectum, it acts in certain cases as an excellent anthelmintic. An infusion of bitterwood is, further, a well-known and useful fly-poison; and it appears to act as a powerful narcotic on many quadrupeds.

BITU'MEN (Lat., a kind of mineral pitch). A name applied to a number of inflammable mineral substances varying in chemical composition and ranging in consistency from solid to gaseous. The bitumens consist mainly of carbon and hydrogen, but usually they contain also small amounts of sulphur, oxygen, and nitrogen. The most important substances included under the name of natural gas, naphtha, petroleum, maltha, mineral tar, asphalt, elaterite, wurtzilite, albertite, grahamite, gilsonite, ozocerite, and coal. Natural gas is composed mostly of marsh-gas, with small quantities of other hydrocarbons and of carbon oxide. Petroleum and naphtha and the solid bitumens are essentially hydrocarbon compounds, containing also subordinate amounts of sulphur, oxygen, and nitrogen, and other elements which may be regarded as impurities. The bitumens are widely distributed over the earth's surface, and occur in all the geological formations from the Silurian to the present. Their origin in most cases can be traced to the decomposition of vegetable matter, but various theories have been advanced to account for the deposits of petroleum. The several bitumens are described in special articles. See ANTHRACITE; ASPHALTIC COAL; BITUMINOUS COAL; LIGNITE; COAL; GAS (NATURAL); NAPHTHA; PETROLEUM; ASPHALT; BITUMINOUS LIMESTONE; BITUMINOUS SHALE; ELATERITE; ALBERTITE; and GRAHAMITE.

BITU'MINOUS COAL (Lat. *bituminosus*, from *bitumen*, a kind of mineral pitch, bitumen). A term applied to the varieties of coal which contain a large percentage of volatile matter. They yield, by destructive distillation, a considerable quantity of gas, easily purified, and with good illuminating qualities, and are consequently largely used for that purpose. Some varieties also cake when heated out of contact with the air, and yield a hard, porous product known as coke. See COAL; COKE.

BITUMINOUS LIMESTONE. A limestone impregnated and sometimes deeply colored with bituminous matter derived from the decomposition of animal and plant remains entombed within the mass or in its vicinity. The amount of bituminous matter or asphalt in the pores of the rock is sometimes sufficient to permit the material being used for asphalt pavements after simply powdering and heating it. Still better results are obtained by mixing it with bituminous sandstone. In the United States, bituminous limestone occurs in Indian Territory, Texas, and Utah. Much bituminous limestone is also mined in Germany, Switzerland, and France, whence large quantities of it are brought to the United States. See ASPHALT; PAVEMENT; ASPHALTIC COAL.

BITUMINOUS SANDSTONE. A sedimentary rock of siliceous character, containing more or less asphalt or bitumen. When rich in bitumen it is a valuable economic product; sometimes it is used directly as a paving material, but more often it is previously subjected to a process of refining. In the United States it is mined in California, Kentucky, and Indian Territory. The output in 1900 was 34,277 short tons, valued at $138,892. Consult the volumes of *The Mineral Industry*, especially Vol. VIII. (New York, 1900). See BITUMEN; ASPHALT.

BITUMINOUS SHALES. Beds of shale occurring chiefly in the coal-measures, and containing such an amount of carbon and volatile matter that they are capable of being burned when mixed with but a little coal. They are indeed impure coal, with a large percentage of ash or earthy matter, which after burning retains the original form. See COAL; OIL-SHALES.

BITZIUS, bēt'sē-ōōs, ALBERT (1797-1854). A Swiss author, known also by his pseudonym, *Jeremias Gotthelf*. He was born at Murten (Freiburg), studied at Göttingen, and was pastor at Lützelflüh (Bern) from 1832 until his death. His works deal with the Canton of Bern, and are written in the popular dialect. They have become classic in Switzerland, and have found a wider circulation through translations into High German. A fine edition of his complete writings appeared at Chaux-de-Fondes in 1894-96 (4 vols.). Selections are accessible under the title *Ausgewählte Erzahlungen* (1888) in Reclam's *Universalbibliothek*.

BIVOUAC, bĭv'wăk (Fr., probably from Ger. *Beiwache*, *Beiwacht*, from *bei*, by + *Wache*, watch, guard), MILITARY. An encampment of soldiers in the open air; generally of a temporary nature. In active service, and in an enemy's country, great care must be exercised in

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the choice of ground for a bivouac. It must be, as far as possible, free from being commanded by artillery fire, capable of hasty defense, offer few (if any) advantages to an enemy, and be near water facilities for men and animals. See ENCAMPMENT; CAMP, MILITARY; and CANTONMENT.

BIWA, bē'wä. A beautiful lake in the southern part of the island of Nippon, Japan (Map: Japan, E 6). It is about 36 miles long, 12 miles in width, and lies at an altitude of about 400 feet. The western shore is mountainous and the eastern is low. There are several small islets in the lake, and fish are found in abundance. Biwa is connected by several canals with the inlet of Osaka, and supplies water-power to the mills and factories in Kyoto.

BIX'BY, JAMES THOMPSON (1843—). An American Unitarian minister. He was born at Barre, Mass., July 30, 1843; graduated at Harvard College and at Harvard Divinity School; entered the ministry, and has served in various places; since 1885, at Yonkers, N. Y. He was professor of the philosophy of religion in the Meadville Theological School from 1879 to 1883, when he went abroad for study and travel, and in 1885 received the degree of Ph.D. at the University of Leipzig. He is the author of *Similarities of Physical and Religious Knowledge* (1876; 2d ed. under the title, *Religion and Science as Allies*, 1889); *The Crisis in Morals; Examination of Rational Ethics in the Light of Modern Science* (1891; 2d ed. under the title, *The Ethics of Evolution*, 1900); *The New World and the New Thought* (1902).

BIXIN. See ARNOTTO.

BIXIO, bēk'sē-ō, GIROLAMO (called *Nino*) (1821-73). An Italian patriot. He was born in Genoa, and was the brother of Jacques-Alexandre Bixio. He participated in the unsuccessful struggle of the Venetians against Austria, and after joining Garibaldi in Rome (1848), commanded the Roman troops that repulsed the first attack of the French General Oudinot (1849). He commanded one of Garibaldi's vessels during the celebrated expedition to Sicily in 1860, and after capturing Reggio and fighting in the battle of Volturno (1860) was made lieutenant-general. He served in the War of 1866, and in 1870 forced the capitulation of Cività Vecchia. In 1866 he was elected a member of the Chamber of Deputies, and in 1870 he was called to the Senate. He died while on an expedition in the East Indies. Consult: Guerzoni, *La vita de Nino Bixio* (Florence, 1875); Delvecchio, *Cenni biografici di Nino Bixio* (Genoa, 1887), and C. Martinengo, *Patrioti italiani* (Milan, 1890).

BIXIO, JACQUES-ALEXANDRE (1808-65). A French publicist and politician, born at Chiavari, then in the Department of the Apennines. He was concerned in the Revolution of 1830, and in 1848 was influential as a leader of the opposition. Under Louis Napoleon he received various political honors. His political career ended with the coup d'état of 1851. In 1831 Bixio, with Buloz, founded the *Revue des Deux Mondes*.

BIYSK, bēsk. A district town in the Government of Tomsk, Siberia, situated on the river Biy, 340 miles south of Tomsk, and 2500 miles east of Moscow (Map: Asia, H 3). It is a thriving town, carrying on a brisk trade with the Chinese and the Altai Kalmucks, exchanging hardware, printed cloth, leather, soap, tobacco, etc., for cattle and hides; the hides are then dressed in the tanneries of Biysk and resold to the Mongols as leather. Population, in 1897, 17,200.

BIZERTA, bĭ-zĕr'tä, or **BENZERTA**, benzĕr'tä (Lat. *Hippo Diarrhytus* or *Zarytus*, Gk. *Ἱππὼν Ζάρρυτος*, *Hippōn Zarrhytos*, from Phœnician *hippo*, a walled town + Gk. *διάρρυτος*, *diarrhytos*, intersected by streams). A fortified seaport of Tunis, 38 miles northwest of the capital, Tunis, at the mouth of a lagoon communicating with a deep gulf or bay of the Mediterranean (Map: Africa, near Farina, E 1). Formerly one of the best Mediterranean ports, the harbor was allowed to silt, and for centuries was useless, until the dredging and completion of breakwaters in 1894 reopened it as an important naval station for the French, who have occupied the city since 1881. It has important fisheries. The adjacent country is remarkably fertile, but its cultivation is neglected. The town is surrounded by walls, and defended by two castles, which, however, commanded by the neighboring heights, are useless against a land attack. Hippo Diarrhytus, or Zarytus, was founded by the Tyrians. Agathocles, between the years B.C. 310 and 307, fortified the place and provided it with a new harbor; and under the Romans it was a free city. Population, 8000.

BIZERTA, or **BENZERTA**, LAKES OF, the ancient *Hipponitis Palus* and *Sisaræ Palus*. Two small lakes of Tunis, lying south of the town of Bizerta, whence they derive their name. They abound in fish, especially mullets, from the roes of which, *botargo*, an important article of Levantine trade, is manufactured.

BIZET, bē'zā' (ALEXANDRE CÉSAR LÉOPOLD) GEORGES (1838-75). A French operatic composer. He was the son of a singing-master in Paris, and was generally regarded as a child prodigy. At nine he entered the Conservatoire, where his masters were Marmontel in piano, Zimmermann in harmony, Benoist in organ, and his future father-in-law, Halévy, in composition. For a decade he carried off nearly all the Conservatoire prizes, and in 1857 his comic opera, *Le docteur miracle*, was awarded the palm over sixty other compositions in a competition established by Offenbach. Several months later he won the Prix de Rome, and the dream of his life was realized. He plunged into the study of the great Italian masters of Church music, at the same time broadening and deepening his mental and artistic equipment by voracious reading and constant visits to the museums and galleries in Rome. His letters of this period mirror faithfully the striking growth of the artist, and, more unusual still, the modest consciousness of this growth. While in Italy he composed the opera *Don Procopio*, discovered in 1895 among the papers of Auger; two movements of a symphony, and a comic opera, *La guzla de l'Emir*. He returned to Paris a finished composer, yet his opera *Les pêcheurs de perles*, a tale of Hindu love, was produced at the Théâtre Lyrique (1863) with no particular success. *La jolie fille de Perth*, based on Scott's novel, was more favorably received by the critics. Bizet now accepted Wagner's contentions for dramatic verity in opera without accepting his methods of attaining it. These were the years of exoticism in music, which was inaugurated by Félicien David (q.v.), and at which Bizet had already

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tried his hand. *Djamilch* (1872), a one-act tragedy of unrequited love in the Orient, was brushed away by the public as too Wagnerian and untheatrical, but the author was "absolutely sure that he had found his way; he knew what he was doing." Technical mastery, Gallic deftness and delicacy of touch, emotional depth and sincerity, were all concentrated in this tale of suppressed passion amid the languorous surroundings of a Cairo harem. Unlike David, with whom Orientalism was the aim and essence of the composition, Bizet employed it only as a background, an atmosphere for universal and eternal emotions. This little masterpiece was followed in the same year by the incidental music to Daudet's drama *L'Arlésienne*. The spirit of 'fair Provence' was transmuted into tones with wonderful power. The public paid no attention to the entre-act music, performed amid the chattering usual between the acts, and yet at present the music and the drama have grown to be considered as inseparable as is Mendelssohn's music from Shakespeare's *Midsummer Night's Dream*, or Beethoven's music from Goethe's *Egmont*. The discouraged composer tempted fortune for the last time with *Carmen* (1875), based on Mérimée's novel. Another failure, and in a few months the master died at Bougival (of consumption, probably), carrying to his grave the conviction that he had created a chef-d'œuvre—an opinion in which musicians of all schools and tastes concur at present, when *Carmen* is one of the half-dozen most popular operas of the lyric stage. "Dramatic and picturesque," *Carmen* delineates in masterly style the psychology of the wayward heroine from the whimsical coquetry of the first scene to the fatalistic bravado of the tragic dénouement. The development of the choler in the weakling Don José, driven by Carmen's heartlessness to despair and murder; the purity and devotion of the lachrymose Micaela; the pleasure-loving bull-fighter—all these once seen and heard are never forgotten. Even to the minor personages, each speaks an individual musical language.

Besides two overtures, Bizet wrote piano music and a number of songs, highly valued by connoisseurs.

Bizet was a remarkable reader of orchestral scores at sight, an erudite musician, a man of wide culture and strong artistic convictions. With all his admiration for the music-drama, he did not overburden his *Carmen* with colossal orchestration, nor did he discard the time-honored set numbers and ensembles or make use of the *leit-motif*, except 'reminiscentially.' The choice, too, of subjects for his last two works was in the direction of every-day realism, contrary to the theory that myth is the only subject for a music-drama. France undoubtedly lost in Bizet one of her greatest musicians before he had achieved what was easily within his power to achieve. Consult C. Bellaigne, "Georges Bizet," *Revue des Deux Mondes* (October 15, 1889).

BJARME, byär'me, BRYNJOLF. A pen-name once used by Henrik Ibsen (q.v.).

BJÖRCK, byĕrk, GUSTAV OSKAR (1860—). A Swedish painter, born in Stockholm. He attended the academy in that city, and studied in Munich, Venice, Rome, and Paris. He was made a member of the Stockholm Academy in 1889. Although chiefly distinguished as a portrait painter, he has worked much in other fields.

BJÖRNEBORG, byĕr'ne-bôrg, or **BIORNEBORG** (Finnish *Pori*). A seaport and capital of a district in the Government of Abo Björneborg, Finland, on the eastern coast of the Gulf of Bothnia, at the mouth of Kumo, 76 miles north-northwest of Abo (Map: Russia, B 2), and 156 miles from Helsingfors. It carries on a considerable trade, exporting principally timber (especially to England) and importing rye-flour, salt, and iron. Some ship-building is done here. The larger vessels cannot approach the city, and must anchor off Refso. Population, in 1888, 10,100; in 1897, 11,600.

BJÖRNSON, byĕrn'son, BJÖRNSTJERNE (1832—). A Norwegian poet, dramatist, and novelist. He was born at Kvikne, December 8, 1832, the son of a parish priest. His childhood was passed in Kvikne, Romsdal, and Molde, in noble scenery rich in legendary association. He left the University of Christiania for journalism, having already, as a student, written sketches and reviews of plays, and in 1858 published his first drama, *Between the Battles*, and his first novel, *Synnöve Solbakken*, translated by Mary Howitt as *Trust and Trial* (1858). He was made director of the theatre in Bergen, and from 1860 to 1863 traveled on a Government stipend, chiefly in Italy. He has since resided in Norway, with frequent visits to Paris, Rome, and Munich. In the winter of 1880-81 he lectured in the United States. Björnson is the greatest distinctively Norwegian writer, so intensely national that the Danish critic Brandes says that "the mention of his name in a gathering of his countrymen is like running up the national flag." He is the chief novelist, probably the chief poet, and, with Ibsen, the chief dramatist of his country's history. For more than twenty years he has been a leader of the Republican Party in Norway, and has engaged actively in social and religious controversies. The change in the flag of Norway on January 1, 1901, with all that it symbolizes for independent national entity, is due to Björnson more than to any other man. The poet and the seer has proved himself also a practical politician. As was natural, this has changed the character of his literary work, which was at first purely artistic, but in the stress of controversy has tended to become didactic. The first period is distinctively lyric. His plays of this time are sagas; his narrative epics idyllic, and imbedded in them are gems of song, many widely popular and one 'national.' These were collected in *Poems and Songs* (1870), and in that year appeared his only epic, *Arnljot Gelline*, founded on an episode in the *Heimskringla*. Since then Björnson has written little verse. He had already distinguished himself in peasant novels and tales, e.g. *Arne* (1858), *A Happy Boy* (1860), and *The Fisher Maiden* (1868), primitive pastorals, genuine yet modern. The dramas of these years are based on the native sagas, the best of them, *Sigurd Slembe* and *Sigurd Jorsalfar* (1872), on the *Heimskringla*. *Mary Stuart in Scotland* (1864) is an isolated exception, as is the problem play *The Newly Wedded Pair* (1866). This latter style is characteristic of the whole drama of the second period beginning with *The Editor* (1874), and counting *A Bankruptcy* (1875), *The King* (1877), *Leonarda* (1879),

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The New System (1879), *A Glove* (1883), *Beyond Our Strength* (1883), and *Geography and Love* (1885). Of these, *The King* is the most radical, and thought by its author the most important. The novels show the same evolution from *The Bridal March* (1873) through *Magnhild* (1877), *Captain Mansana* (1879), and *Dust* (1882), to the true problem novels *The Heritage of the Kurts* (*Det Flager*) (1884) and *In God's Way* (1889), the former dealing with redemption from heredity through education, the latter with bigotry and liberal thought. This brought on Björnson the imprecations of the orthodox, though its aim was to exalt and purify religion. It is Björnson's latest notable work. There are translations of Björnson's novels by Anderson, and of *Sigurd Slembe* by Payne (Boston). Consult: Brandes, *Moderne Geister* (Frankfort, 1897); Anderson, "Biographical Sketch," in *Synnöve Solbakken*, translated by Anderson (Boston, 1882); Gosse, "An Essay on the Writings of Björnson," in *Björnson, Novels* (London, 1895); Boyesen, *Essays on Scandinavian Literature* (New York, 1895).

BJÖRNSTJERNA, byĕrn'shĕr'nâ, MAGNUS FREDRIK, Count (1779-1847). A Swedish soldier, statesman, and author. He was born in Dresden, where his father resided as secretary to the Swedish Legation. He received his education in Germany, and joined the Swedish Army in 1793. He distinguished himself in the Finnish War, and in 1813 was appointed colonel in the army that went to aid the Allies in Germany; took part in the conflicts at Grossbeeren and Dennewitz; was present at Leipzig, and concluded the formalities of capitulation with the French at Lübeck and Maestricht. Subsequently, he fought in Holstein, and in Norway, where he signed the treaty which united that country with Sweden. In 1828 he was appointed Ambassador to the Court of Great Britain, which office he held till 1846, when he returned to Stockholm, where he died. In addition to some political writings, he published *The Theogony, Philosophy, and Cosmogony of the Hindus* (Stockholm, 1843).

BLAAS, bläs, EUGEN von (1843—). An Italian painter. He was born in Albano, Italy, and received his education from his father, Karl von Blaas, and afterwards at the Vienna Academy. He settled in Venice, the life of which, past and present, he has depicted in his pictures. The following are among his best works: "Conversion of the Rhætians by Saint Valentine," "Faust and Marguerite in the Garden," "Cimabue and Giotto," "Scene from Decameron," "Dogaressa Going to Church," "Venetian Balcony Scene," "Bridal Procession in San Marco," "Venetian Masquerade."

BLAAS, JULIUS von (1846—). A painter, brother of Eugen von Blaas (q.v.). He was born in Albano, Italy, and after studying with his father, went to Rome, where he painted genre scenes from the Campagna. His "Race of Intoxicated Slavonic Peasants," which he painted in 1869, is in the Vienna Imperial Museum. He preferably depicts equestrian scenes. Other pictures by him are the following: "Fox-Hunt in the Campagna" (1877); "Market in Upper Hungary" (1885); "Horse-Fair in Bischofshofen" (1888).

BLAAS, KARL von (1815-94). An Austrian painter, born at Nauders in the Tyrol. He studied in Innsbruck, Venice, Florence, and Rome, and was appointed professor at the Academy of Vienna in 1850. He painted thirty-three frescoes for the Altlerchenfeld Church of that city. In 1855 he received a prize at the Paris Exposition for the picture entitled "Charlemagne Visiting a Boys' School" (Venice Museum), and in the same year he accepted a professorship at the Venice Academy. He returned to Vienna in 1866. Among his most celebrated productions are the following: "Tullia Driving Over Her Father's Body" (1832); three frescoes in the church at Fóth, near Budapest; "Rape of Venetian Brides in Sixth Century" (1858; Innsbruck Museum); forty-two scenes in fresco (Vienna Arsenal); portraits of Francis Joseph and of the Queen of Spain; "Ekkehard Carrying the Duchess of Suabia Across the Threshold of the Monastery."

BLACK. In art, black is the name of the darkest color—that which, according to physical scientists, is produced by the absence or by the complete absorption of the rays of light. See COLOR.

BLACK, ADAM (1784-1839). An English publisher. With his nephew, Charles Black, he established a publishing house in Edinburgh, which began issuing the *Edinburgh Review* in 1826, and secured the copyrights of the *Encyclopædia Britannica* in 1829 and of the *Waverley Novels* in 1851. Besides managing this immense business, he was Lord Provost of Edinburgh from 1843 to 1848, and was a member of Parliament, as the successor of Macaulay, from 1856 to 1865. Consult Nicolson, *Memoirs of Adam Black* (London, 1885).

BLACK, HUGH (1868—). A Scotch clergyman and author, born at Rothesay. He studied at the Glasgow University, and was ordained to the Presbyterian ministry in 1891. From 1891 to 1896 he was pastor at Paisley, and in the latter year was called to Saint George's Free Church, Edinburgh. His publications comprise *Friendship* (1898), and *Culture and Restraint* (1901).

BLACK, IVORY. The pen-name of Thomas A. Janvier.

BLACK, JAMES (1823—). An American temperance agitator. He was born at Lewisburg, Pa., was educated at the academy there, and in 1846 was admitted to the bar. In 1852 he took an active part in the movement to have a law enacted for the prohibition of liquor in Pennsylvania. His efforts in this direction were constant, and led to the formation of a Prohibition Party at Chicago in 1869. In 1872 he was the first nominee of the party for President, and received 5608 votes. He was chairman of a committee appointed in 1876 to organize the National Prohibition Reform Party, and started a temperance publication society. Among his writings are: *Is There a Necessity for a Prohibition Party?* (1876); *A History of the Prohibition Party* (1880); and *The Prohibition Party* (1885).

BLACK, JEREMIAH SULLIVAN (1810-83). An American jurist and statesman. He was born in Somerset County, Pa.; received a common-school education, studied law, was admitted to the bar

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in 1831, and soon acquired a considerable practice. He served for some time as deputy attorney-general for Somerset County, and from 1842 to 1851 was president-judge of the Sixteenth Judicial District of Pennsylvania. He was one of the Supreme Court Justices of Pennsylvania from 1851 until 1857, when he became Attorney-General of the United States in President Buchanan's Cabinet. In this capacity he protected the Government against the frauds involved in many of the famous 'California land-claims,' which grew out of alleged Mexican grants covering 19,148 square miles issued before the cession of California to the United States; and on the approach of the Civil War contended vigorously against any interpretation of the Constitution which would justify secession or would prohibit the President from suppressing insurrection or protecting Federal property against the attacks of State forces. Black replaced Cass as Secretary of State in December, 1860, and soon afterwards rendered an important service to the country by inducing Buchanan to take a firm attitude in his negotiations with the South Carolina commissioners with regard to the withdrawal of the United States troops from Fort Sumter. At the close of Buchanan's administration, Black served for a time as United States Supreme Court reporter, but resigned to devote himself to his private practice, and subsequently took part in many celebrated cases. He was counsel for President Johnson in the famous impeachment trial of 1868, but withdrew from the case after the President's answer had been filed. In 1877 he was conspicuous as one of Tilden's counsel before the Electoral Commission (q.v.), and afterwards wrote an able argument against the decision of the Commission in favor of Hayes. Besides winning a foremost place at the bar, Judge Black was known as a thorough classical scholar and a brilliant conversationalist. Soon after his death the Bar of the Supreme Court of the United States spoke of him as having been "a lawyer profoundly versed in the science of the law and worthy to be ranked with the greatest and ablest of our age and country." Consult C. F. Black, *Essays and Speeches of Jeremiah S. Black, with a Biographical Sketch* (New York, 1885).

BLACK, JOHN (1783-1855). A Scottish journalist. He was born near Dunse, where he pursued his studies, and was subsequently articled to a writer. He afterwards obtained employment as an accountant in Edinburgh, attending classes at the University, and doing some literary work. He became a reporter for the London *Morning Chronicle* in 1810, and editor in 1817. John Stuart Mill says that Black "played a really important part in the progress of English opinion for a number of years which was not properly recognized," and that he was the "first journalist who carried criticism and the spirit of reform into the details of English institutions." The institutions especially affected by this criticism were the courts and the Church, with the result that the press enjoyed a much larger measure of freedom in dealing with them. Black was a friend of James Mill, and Lords Palmerston, Melbourne, and Brougham, and was a patron of Charles Dickens, whose connection with the *Chronicle* began in 1835. He published translations of Humboldt's *Political Essay on New Spain* (1811-12); von Buch's *Travels in Norway and Lapland* (1813); Berzelius's *System of Mineralogy* (1814); and Schlegel's *Lectures on Dramatic Literature* (1814).

BLACK, JOSEPH (1728-99). A Scottish chemist. He was born in Bordeaux, France, where his father was engaged in the wine-trade. Both his parents were of Scotch descent, but natives of Belfast, whither their son was sent for his education in 1740. In 1746 he entered the University of Glasgow; in 1751 he went to Edinburgh to complete his medical course, and in 1754 took his degree. His thesis on the nature of the mild and caustic alkalies and alkaline earths contained his first contribution to chemical science. In those days the transformation by heat of a mild alkali (a metallic carbonate) into the corresponding caustic alkali (an oxide, or hydroxide) was interpreted on the hypothesis that the mild alkali combines with the fiery principle called phlogiston, and thus the caustic alkali is produced. Black showed, however, that the transformation was accompanied by a loss of weight, and that during the transformation an aëriform substance escaped from the mild alkali. This aëriform substance he found to be different from atmospheric air, and gave it the name of *fixed air*. Thus the existence, both in the free state and in combination, of a gas different from air —namely, carbonic acid—was first clearly established by Black. Black succeeded Cullen as professor of anatomy (which branch he afterwards exchanged for medicine) and lecturer on chemistry in Glasgow. Between 1759 and 1763 he evolved that theory of 'latent heat' on which his scientific fame chiefly rests, and which formed the immediate preliminary to the next great stride in discovery by his pupil and assistant, James Watt. In 1766 Cullen was appointed to the chair of theoretical medicine in Edinburgh, and Black succeeded him in the chair of chemistry. Thenceforth he devoted himself chiefly to the elaboration of his lectures, in which he aimed at the utmost degree of perspicuity, and with perfect success. Black published: *Experiments on Magnesia, Quicklime, and Other Alkaline Substances; Observations on the More Ready Freezing of Water that Has Been Boiled;* and *Analysis of the Waters of Some Boiling Springs in Iceland.* His *Lectures on the Elements of Chemistry* was published after his death, by Robinson (2 vols., London, 1803). Consult Brougham, *Lives of Philosophers of the Time of George III.* (London and Glasgow, 1855).

BLACK, WILLIAM (1841-98). A British novelist. He was born in Glasgow, November 9, 1841. He studied art for a time in the Government school there, with the intention of becoming an architect; but he soon abandoned art for journalism. After some experience on the *Glasgow Weekly Citizen*, he went to London, where at first he wrote for the magazines. In 1865 he joined the staff of the *Morning Star*, becoming the next year its special war correspondent during the Prusso-Austrian War. Subsequently he was for a short period assistant editor of the *Daily News*. He died December 10, 1898. He produced thirty-odd novels, among which are: *A Daughter of Heth* (1871), which gained him his reputation; *Strange Adventures of a Phaeton* (1872); *A Princess of Thule* (1873); *Madcap Violet* (1876); *Macleod of Dare* (1878);

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Three Feathers (1881); *Shandon Bells* (1883); *Judith Shakespeare* (1884); *In Far Lochaber* (1888); and *Wild Eelin* (1898). As may be observed from these titles, Black laid his scenes mostly in northern Scotland, which he knew and loved well. It was, however, his frequent practice to contrast the simple manners of his country-folk with the London Bohemia. His novels, some of which were extremely popular, show more than average workmanship. None of them quite reach the high art of the great novelists, though *A Daughter of Heth* reveals talent which almost approaches genius. Consult Sir Wemyss Reid, *William Black, Novelist: A Biography* (New York, 1902).

BLACKACRE, JERRY. A coarse bumpkin in Wycherley's *Plain Dealer*, trained to the law by a litigious mother, but cognizant only of its phrases.

BLACKACRE, WIDOW. The mother of the above. She is always involved in a lawsuit. The character is borrowed from the Countess in Racine's *Les Plaideurs*.

BLACK ACTS. Scottish Parliamentary acts dating from 1424 to 1594; so called because they were all printed in the black, or Saxon, characters. The expression 'Black Act' is also applied to an act of George I., directed against poachers who, with their faces blackened or otherwise disguised, and associated, as we are told in the preamble of the act, under the name of Blacks, appeared in Epping Forest, near Waltham, in Essex, destroyed the deer there, and committed other enormities. This act was, along with numerous other statutes, repealed in 1827, by 7 & 8 Geo. IV. c 27.

BLACK APPLE, A name applied in Queensland and New South Wales to *Achras australis*, a tree of the natural order Sapotaceæ. The tree produces an edible fruit about the size of a plum. The timber of this and several other Australian species is close-grained, hard, and easily worked, and is valuable for cabinet-work and for carving, for which it is especially suitable.

BLACK ASSIZE. A popular name commemorative of an extraordinary epidemic of jail fever which broke out at Oxford at the close of the assizes, July 6, 1577. Contemporary accounts describe it as having originated in the court-house immediately after a sentence to lose his ears was passed on Richard Jencks, a bookbinder accused of sedition. It was popularly interpreted as a divine judgment on the cruelty of the sentence; but the phenomenon is satisfactorily explained by the pestilential atmosphere of the adjoining jail, then, as it was until long after, a seat of misery, filth, and disease. From the 6th of July to the 12th of August, 510 persons are said to have died in Oxford and the neighborhood of this terrible malady, among whom were the chief officials who sat at the assize, most of the jury, and many members of the university. Women, poor people, physicians, visitors, and children are said to have escaped the infection. A similar event is recorded as having taken place at Cambridge at the Lent Assizes in 1521. Consult: Holinshed, *Chronicles* (London, 1577; reprint, 6 vols., London, 1807-08); Stow, *Annales* (first edition, London, 1580; ed. Howe, London, 1631); Wood, *Athenæ Oxonienses* (first edition, London, 1691-92; 4th edition, ed. Bliss, Oxford, 1848).

BLACKBAND IRONSTONE. An ore of iron, found commonly in rocks of the Carboniferous system, and to a lesser extent in the Jura-Trias system, of several countries. It occurs in bands or rounded masses, and is often associated with coal, and sometimes with limestone. It is mainly a carbonate of iron, accompanied by some coaly matter and clay impurities. In the United States, blackband ores are obtained in Pennsylvania, Ohio, and Kentucky. In Europe, Scotland yields some. This ore is low in iron, as shown by the percentage composition of an Ohio ore from Tuscarawas: Silica, 26.22; phosphorus, 0.27; iron carbonate, 34.69; iron sesquioxide, 10.42; alumina, 0.70; manganese, 1.70; lime carbonate, 2.00; sulphur, 1.84. Before melting in the blast-furnace, blackband ironstone has to be roasted. It is seldom used alone. See IRON ORE.

BLACK BASS, DUCK, etc. See the substantives.

BLACK BATEMAN OF THE NORTH. See DEKKER, THOMAS.

BLACK BEETLE. A common name in England for the Oriental cockroach (see COCKROACH); also, rarely, for beetles of the genus Blaps.

BLACKBERRY (*Rubus villosus*). A term applied in America to both upright and decumbent thorny bushes bearing a fruit consisting of an aggregation of small drupes or berries, arranged about the receptacle to which they adhere, and which, when ripe, separates from the plant with the drupes and forms a part of the so-called fruit. In America, the blackberry and dewberry, or running blackberry (*Rubus Canadensis*), are indiscriminately spoken of as blackberries, while the English bramble (*Rubus fruticosus*) is also called a blackberry. In America, these fruits, with the exception of *Rubus fruticosus*, have attained a commercial status, and each year widens their range of cultivation. Although existing in a high state of development as wild plants, they attracted little attention as garden fruits until as late as 1850. Now, however, they are extensively cultivated over a wide area.

The blackberry is propagated almost exclusively from root-sprouts, suckers, and root-cuttings. New varieties are secured by planting the seed, but most of the named varieties now on the market are chance seedlings from wild or cultivated plants. The habit of growth of the blackberry renders it necessary to set the plants not closer than 3 by 8 feet for the smaller growing sorts, while 4 by 10 is not too wide for the larger kinds. The fruit is extensively used for canning, both in a commercial and domestic way; but it finds its chief market as a fresh fruit for dessert purposes. The bark of the root has tonic properties which are much prized by the country folk. A fluid extract made from blackberry-root is sometimes prescribed in cases of diarrhœa. For a discussion of the genus, see RUBUS; and for further information on the Running Blackberry, or brier, see DEWBERRY.

BLACKBERRY DISEASES. See RASPBERRY.

BLACK BESS. The name of the English highwayman Turpin's mare. She is mentioned by Sam Weller, in *The Pickwick Papers*, just be-

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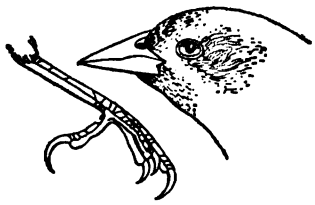
fore he voluntarily went into Fleet Prison, in a song beginning:

"Bold Turpin vunce, on Hounslow Heath,
His bold mare Bess bestrode-er."

BLACKBIRD. Any of several different birds prevailingly black in plumage; in America, a member of the family Icteridæ. About a dozen species dwell in the United States. They agree in the possession of a rather long and slender beak, with cutting edges, and have only nine primaries in the wing; but are distinguished from each other by size and color. The males, when in full plumage, are always more strikingly colored than the females, and generally the contrast is very great. In most of the species the female is not black at all, and the young resemble her. The largest of the American blackbirds are those known as crow-blackbirds—or,



HEAD AND FOOT OF A TYPICAL BLACKBIRD.

more properly, grackles (q.v.)—one species of which reaches a length of 18 inches, but is not so heavy as a crow. The other blackbirds are much smaller—less than a foot in length—and are distinguished from each other chiefly by color. In the eastern United States we have only the cowbird (q.v.) and the red-winged blackbird (*Agelaius phœniceus*), the former uniform lustrous black, with a brown head, and the latter jet-black, with a scarlet patch on each 'shoulder.' (See REDWING.) In the middle West, besides the Eastern species, there occurs the handsome yellow-headed blackbird (*Xanthocephalus xanthocephalus*), in which the whole head and throat is yellow, or even orange. The Pacific Coast has also the red and white shouldered blackbird (*Agelaius tricolor*), which is bluish-black, with a dark blood-red patch on the wing, bordered with pure white. All of these species, except the cowbirds, frequent marshy grounds or swamps to breed, and often gather in large flocks, the more especially during the migrations. They feed on almost everything in the insect or vegetable line; but though they sometimes damage corn-fields, they are beyond question beneficial. The nests are built on or near the ground in the swamps, among reeds or small bushes, and are composed chiefly of dried grass and reeds. The eggs are pale-blue or grayish-green, scrawled or spotted with brown.

In the Western States the lark-bunting (*Calamospiza melanocorys*) is sometimes called the white-winged blackbird, while in the East the bobolink is frequently called the skunk blackbird, on account of its peculiar markings; and in Florida and the West Indies the ani is commonly termed savanna blackbird.

In Europe the name blackbird is given to an entirely different bird, the merle, a thrush (*Merula merula*). It occurs throughout Europe, in North Africa, and in the Azores. The male is deep black, while the female and young are rusty brown. Like the other thrushes, the merle is chiefly insectivorous, though it often eats fruit, and is a fine singer, although the notes are somewhat too loud to make it an acceptable cage-bird. See Plates of BLACKBIRDS and of EGGS OF SONG-BIRDS.

BLACK BOOK. The designation of various historical and other works, so called from the character of their type or their binding or contents. Among the more popularly known are: A university register, in which students' misdemeanors are recorded; any volume treating of necromancy or the 'black art'; and, in Great Britain, the list of habitual criminals published since 1877. The most important historical black books are: The volume formerly attributed to Gervaise of Tilbury, but now known to be the compilation of Nigel, Bishop of Ely (died 1169), giving a detailed description of the Court of Exchequer, its officers, their duties and privileges, etc., also of the revenues of the Crown; a book of admiralty statutes and ordinances of the reign of Edward III., first edited by Sir Travers Twiss (4 vols., London, 1871-76); and a series of reports compiled by order of the visitors to the English monasteries in the reign of Henry VIII. Their presentation to Parliament in 1536 was followed by the suppression of those institutions. These reports probably never formed a bound volume, although one is fabled to have been burned by order of Queen Mary. The reports still in existence are considered by recent historians to be extravagant and malicious in their statements. Consult Gairdner, editor, *Letters and Papers of the Reign of Henry VIII.* (London, 1880-86).

BLACKBREAST. Either of two American bay-birds. (1) The black-bellied plover (*Charadrius squatarola*). (2) The dunlin (*Tringa alpina*); also called blackheart.

BLACK BRUNSWICKERS, or THE DEATH'S-HEAD CORPS. A troop of hussars, organized in Germany by Frederick William, Duke of Brunswick, in May, 1809, during the Napoleonic wars. Their uniform was jet-black, and ornamented with lace in imitation of the ribs of a skeleton. Their helmets were adorned with silver skulls and crossbones, and with black horsehair tresses instead of plumes.

BLACKBUCK (so named from its blackish-brown color; AS. *bucca*, he-goat, *buc*, a male deer, OHG. *boch*, Ger. *Bock*, he-goat). The common antelope of India (*Antilope cervicapra*), which ranges over the whole of the peninsula and Assam, wherever there are open plains. A male blackbuck stands about 32 inches high at the shoulders, and will weigh, alive, about 85 pounds. The horns usually run from 16 to 20 inches in length, but may reach 28 inches. They arise close together, and are cylindrical and ringed, with an elegant spiral twist of from three to four turns. The does are hornless, as a rule.

Old males are among the handsomest of all antelopes, the contrast of the full blackish-brown of the greater part of the head, body, and outer sides of the limbs with the white of the under parts and the ring around the eye being most striking. Young bucks, and the does of all ages, are rich yellowish-brown, rendering them less conspicuous to their enemies. These pretty little antelopes are always found either in open ground, wild, grassy plains, or cultivated tracts, and go in herds, sometimes reaching hundreds,

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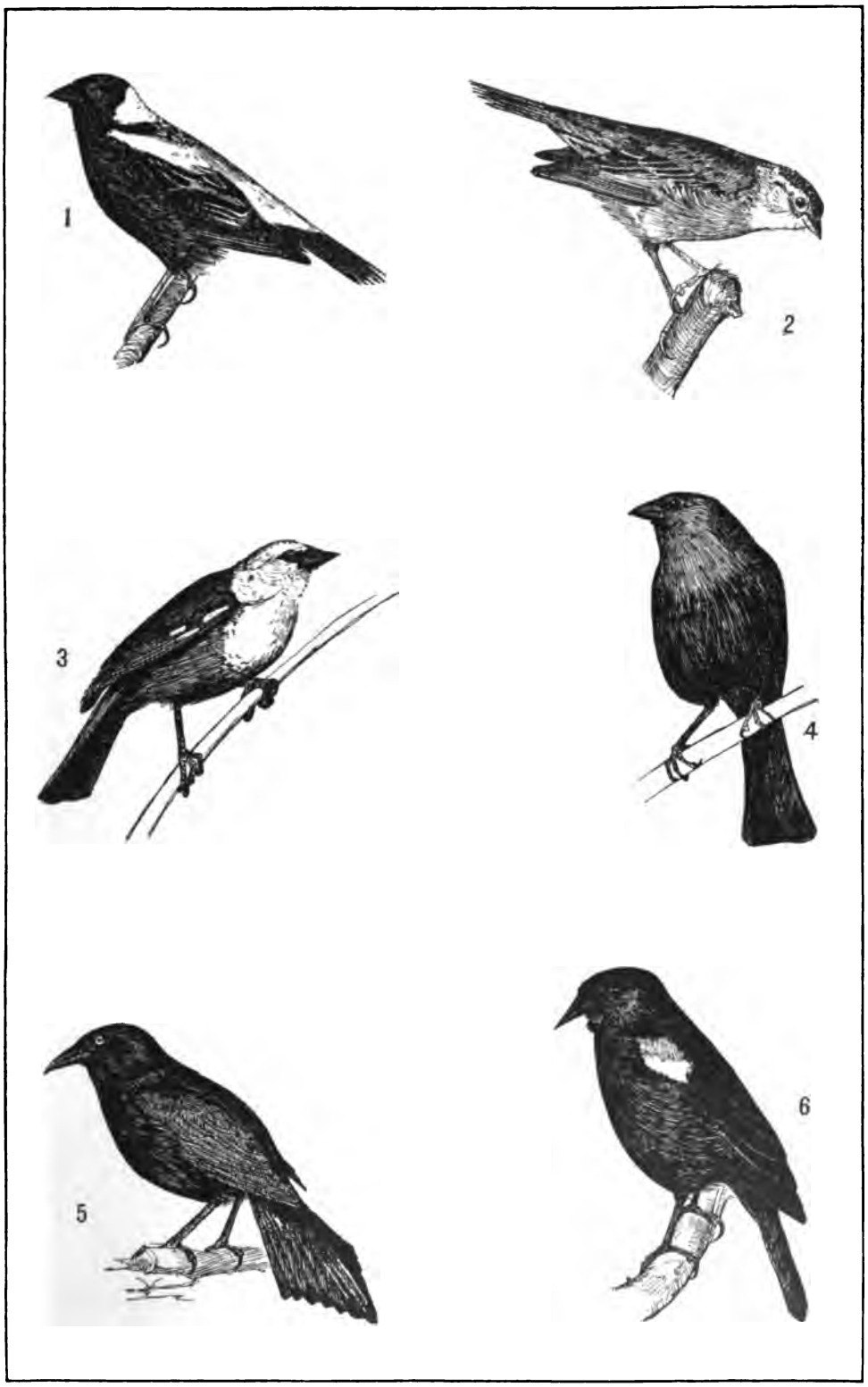
BLACKBIRDS



1. BOBOLINK (Dolichonyx oryzivorus); male in summer plumage.
2. BOBOLINK; female.
3. YELLOW-HEADED BLACKBIRD (Xanthocephalus xanthocephalus).
4. COW-BIRD (Molothrus ater).
5. PURPLE GRAKLE (Quiscalus quiscula.)
6. RED-WINGED BLACKBIRD (Agelaius phœniceus).

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or even thousands, in number. Ordinarily, however, bands containing only from ten to forty individuals are met with, led by one shining, black-coated old buck. See Plate of GAZELLES.

Sport.—They are a favorite object of sport, but in many parts of India are so protected by the prejudice of the natives as to suffer little from the gun. The literature of sport with the gun in India abounds in descriptions of blackbuck hunting. The usual method is by chasing them with greyhounds. Where the plains are very sandy, this coursing is usually successful, and it affords the sportsmen who follow the dogs on horseback the exhilaration of a fine burst of speed before seeing the prey pulled down; but elsewhere, on open, hard deserts, or where plains of tough turf give the fleet little animals a good foothold and fair start, it is rare that the best of dogs can catch them. They are also chased with the cheeta and with falcons. The name is sometimes applied to the African sable antelope.

BLACK BULLY, BALLY-TREE WOOD, or SAPODILLA PLUM (*Achras sapota*). A tree peculiar to South America and the West Indies, having a durable wood that is used for shipbuilding, and a milky juice which is thickened by evaporation and imported as gutta-percha. The tree is extensively cultivated throughout the tropics, on account of its excellent fruit. The bark is febrifugal, and the seeds have diuretic and aperient properties.

BLACK'BURN (named after the river Blackburn, from AS. *burna*, brook, stream, Ger. *Brunnen*, well, Engl. *burn*, rivulet, brook). A manufacturing town in Lancashire, England, on the Blackburn, and the Leeds and Liverpool Canal, 21 miles north-northwest of Manchester (Map: England, D 3). Among its notable public buildings are a handsome town-hall, a fine Gothic exchange, and a newly erected drapers' hall. There are two large parks—Corporation Park and Queen's Park, opened in 1887. Blackburn was incorporated in 1851, and since that date has rapidly advanced to the front rank of flourishing manufacturing towns. It has owned its water-supply since 1875. The acquisition of the gas-works followed in 1877, and in 1895 the corporation began the supplying of electricity. The street railways and suburban lines were taken over in 1899. The town also maintains public baths, markets, slaughter-houses, and cemeteries. Among its educational institutions are an ancient grammar school, founded by Queen Elizabeth in 1567; a technical school, maintained by the corporation; a public library, with which is connected a museum; and an art gallery. The town also maintains two hospitals. It has a modern and profitable sewage system, including extensive irrigation-works, precipitation plant, and two sewage farms. The great business of the town is the manufacture of cotton stuffs. There are also woolen-factories, and large establishments for the manufacture of weaving-machinery. Here James Hargreaves (q.v.), a native of the town, invented the spinning-jenny in 1767. He was driven out of the town by a mob of workingmen, who feared that machinery would deprive them of their livelihood. Population, in 1891, 120,064; in 1901, 127,527.

BLACKBURN, WILLIAM MAXWELL (1828—). An American clergyman and author. He was born in Carlisle, Ind., graduated in 1850 at Hanover College, and in 1854 at the Princeton Theological Seminary; and held pastorates in Erie, Pa., and Trenton, N. J. In 1868 he was appointed professor of biblical and ecclesiastical history in the Presbyterian Theological Seminary in Chicago, Ill. He was appointed president of the Territorial University of North Dakota in 1884, and in 1886 of Pierre University (now Huron College). He has contributed to the *Princeton Review* and other periodicals, and has published: *Exiles of Madeira* (1862); *The Rebel Prince* (1864); *The College Days of Calvin* (1866); *Ulrich Zwingli, the Patriotic Reformer* (1868); and *The Theban Legion* (1871).

BLACK'BURNE, FRANCIS (1782-1867). An Irish Lord Chancellor. He was born at Great Footstown, County Meath, November 11, 1728. He entered Trinity College, Dublin, in 1798, where he brilliantly distinguished himself. He studied law in Dublin and London, and was admitted to the English bar in 1805 and to the Irish bar in 1822. In 1830 he was Attorney-General for Ireland, under Earl Grey's Government. When a renewal of the Insurrection Act was necessitated by the disturbed state of Ireland, Blackburne devoted himself to the vigorous application of that measure in Limerick, and at the end of two years succeeded in restoring order. His activity against the riotous opponents of the collection of tithes, and a legal victory gained over O'Connell, antagonized that politician and his followers, and their bitter attacks led to his resignation. In the critical period of 1847-48 he presided with conspicuous ability in the prosecution of Smith O'Brien and others who were convicted of treason. In 1852 he was made Lord Chancellor, but resigned soon afterwards. In the same year he was appointed a commissioner of education, and in 1856 became Lord Justice of Appeals. He accepted the office of Chancellor for the second time in 1866; but his appointment being loudly condemned, he was induced to resign. He was for some years vice-chancellor of Dublin University, and in 1867 declined Lord Derby's offer of a baronetcy. See O'CONNELL, DANIEL, and consult E. Blackburne, *Life of Lord Chancellor Francis Blackburne* (London, 1874).

BLACKBURNE, JAMES HARRY (1842—). An English chess-player. He was born in Manchester, and first became known as a chess-player in 1861. There have been few tournaments within the past thirty years in which Blackburne has not been successful, and he has won more prizes than any other player of his day. Although less fortunate in single-handed competitive contests, his achievements as a blindfolded player may be ranked with those of Paulsen and Zuckertort.

BLACKCAP. A name in England and America of various small birds which have the top of the head black. In America it is properly applied to one of the fly-catching warblers (*Sylvania pusilla*), a small olive and yellow bird, the male of which has the top of the head rich, lustrous black. It frequents swamps and low woodlands, where it is very active in search of its insect prey, and builds its nest near the ground. The black-capped titmouse, or chickadee, also frequently receives this name in the United States. See TITMOUSE.

In Europe the name is given to one of the warblers (*Curruca atricapilla*), closely allied to the nightingale, and one of the sweetest song-

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ily Simuliidæ. All the insects of this family are short, small, and thick-bodied, having no simple eyes and no transverse suture in the thorax; they rarely exceed one-fourth inch in length. The larvæ of these flies are aquatic, unlike mosquitoes, living in swift-running streams. Their eggs are deposited in closely packed layers on rocks near or below the surface of the water, into which the larvæ drop when freed from the egg and become attached to plants, stones, etc., by a silken thread, or sometimes to each other, forming long floating strings; they soon pupate within silken cocoons, open at the ends so as to admit water. There may be several broods, the last producing young that hibernate in the larval stage. Hence the first emergence of imagoes (flies) is early in the spring. As summer advances the insects become excessively numerous in such favorable regions for them as the well-watered forests of northern New York, Maine, and Canada, where in hot weather they abound in such swarms as to put a stop to work in the woods, and even to cause the death of poultry and other animals which cannot escape them. In Labrador, life is practically impossible away from the seashore while the flies are in force. They suck the blood like mosquitoes, but, unlike them, are worse in sunshine, becoming dormant on cloudy days. Three or more species are known, that of the Saint Lawrence Valley (*Simulium invenustum*) being different from that of Lake Superior. To protect themselves, people build smudges and smear their faces and hands with ointments, of which the best is oil of tar, habitually used by the employés of the Hudson Bay Company. Consult, for a monograph of the group, *Bulletin No. 10*, Ent. Division, U. S. Dept. Agric. (Washington, 1898). See BUFFALO-GNAT.

BLACKFOOT (for origin of name, see below). An Algonkian tribe of the Plains, formerly roaming over the country about the head of the Missouri, from the Yellowstone northward to the North Saskatchewan and westward to the Rocky Mountains. They are now confined to reservations in Montana and the adjoining territory of British America. The name Blackfoot is said to have been given to them from the fact that when they first appeared in the Upper Missouri country their leggins were black, as a result of their traveling over the recently burned prairie. They call themselves 'plains men' or 'people of one language.' They are divided into three great subtribes: The Siksika or Blackfoot proper, Kaina or Blood, and Pikuni or Piegan, each in turn being subdivided into bands. They have also a well-developed military organization, with promotion and degrees of rank. Associated with them are the weaker tribes, Arapaho, Grosventres, and Sarsee (q.v.). Less than a century ago they were one of the strongest and most warlike tribes of the Plains, being estimated as high even as 40,000 souls. They still number over 5000, of whom about 2100 are on the Blackfoot Reserve in Montana, the others being in British America. Grinnell (*Blackfoot Lodge Tales*, 1892) has made an interesting study of their mythology.

BLACK FOREST (Ger. *Schwarzwald;* so called from the dark foliage of its fir and pine trees). A wooded mountain region in the southwestern part of Germany, occupying the southern part of Baden and the western part of Württemberg (Map: Germany, C 4). It runs in a direction from south to north; its natural boundaries on the east are formed by the Nagold and the Neckar, while on the south and west it is bounded by the Rhine. Its length is about 100 miles, its width varies from about 38 miles in the south to about 14 miles in the north, while its entire area is estimated at about 1900 square miles. The western slope of the region falls off abruptly toward the valley of the Rhine, in contrast to the eastern slope, whose incline is very gradual. The southern, or upper part, which is the widest part of the region, contains also its greatest elevations, as the Feldberg, 4860 feet, which is the highest peak of the entire region, and sends off numerous offshoots, ranging in altitude from 3900 to 4200 feet; the Herzogenhorn, 4610 feet, the Belcher, 4600 feet, and a number of inferior elevations. Near Altbreisach, in the District of Freiburg, is situated the isolated volcanic mass of the Kaiserstuhl. The northern or lower part of the region is inferior in elevation to the southern, and is less mountainous in general appearance. Its highest peak is the Hornisgrinde, 3790 feet, and there are a number of other elevations of a little over 3000 feet. The region of the Black Forest gives rise to a number of rivers, including the Danube and Neckar, and contains a number of lakes on its eastern slope. Geologically, the region is composed of Archæan granites and gneiss, which form its core; porphyry, found mostly on the sides; and sandstone, which occurs mostly in the more elevated parts and also at the base. The mineral resources of the region are of little importance, and its deposits of silver, cobalt, and copper are practically exhausted. Mineral springs, however, are abundant and include such well-known health resorts as Baden-Baden and Wildbad. The climate is on the whole healthful, although somewhat raw in the more elevated parts. In the plains agriculture and cattle-raising are pursued with more or less success, and there are some vineyards on the western slope. The region is very well wooded, and the chief occupation of the inhabitants is the production of wooden clocks, musical instruments, and other manufactures of wood, as well as watches. The Black Forest is much frequented and has a number of roads and passes, among which the Höllenthal Pass, near Neustadt, is the best known. It is crossed by a number of railway lines. Two of the passes of the Black Forest, the Kniebis and the Hölle, acquired considerable celebrity during the wars of the French Revolution. The first, situated on the borders between Baden and Württemberg, at the source of the Murg, was taken by the French in 1796 and in 1797; the Hölle is known in connection with Moreau's retreat in 1796.

The Black Forest has been made the scene of many weird and curious stories, and it is associated with a vast number of legends, folk-tales, and popular superstitions.

BLACK FRIARS. See DOMINICANS.

BLACKFRIARS THEATRE. The first regular playhouse in the District of Blackfriars. It was erected in 1596 by James Burbage, who got its site and part of its structure as a gift from Sir Thomas Cawarden's executor. Shakespeare played here in 1598 in Ben Jonson's *Every Man in His Humour*. Burbage's company, which occupied the place, was known first as the Lord Chamberlain's Company, and then as the King's Servants. The theatre was torn down in 1655.

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BLACK FRIDAY. The name applied to two disastrous days in the financial history of the United States. On Friday, September 24, 1869, a panic was caused in Wall Street by the effort of Fisk and Gould to corner the gold market, gold rising to 163 1-3, and on Friday, September 19, 1873, occurred in the New York Stock Exchange the great financial crash which was followed by the widespread 'panic of 1873.' For 'Black Friday' of 1869, consult an article in *The Yale Review*, Vol. III. (New Haven, 1896).

In England the name Black Friday is given to December 6, 1745, the day on which news reached London that the Pretender had arrived at Derby; again, May 11, 1866, when the failure of Overend & Gurney (on the previous day) brought on a most disastrous financial panic. See Julgar's *Short History of Panics* (New York, 1893). Good Friday is also known as Black Friday in the Western Church, because on that day clerical vestments and altar draperies are black.

BLACK GAME, or HEATH GAME. See BLACKCOCK.

BLACK GUARDS. A name originally applied to the scullions and lower servants of the English Court, who were clothed in black garments. Gibbon says "those who carried coals to the kitchen, rode with the pots and pans, and were in derision called the Black Guards." The title is recognized in an official proclamation of 1683, which begins, "Whereas, a sort of vicious, idle, and masterless boyes and rogues, commonly called the Black Guard, with divers other lewd and loose fellows," etc.

BLACK GUM, or SOUR GUM. The popular name of the *Nyssa multiflora*, the Hornpipe of New England, and Pepperidge and Tupelo of our Middle and Southern States. It grows in thick forests, has crooked branches, and is densely covered with bright-green leaves in tufts at the ends of the branches; bears flowers of greenish hue, ovoid fruits, becoming blue-black as they ripen; wood close-grained and very tough, but not durable. The timber is used for hubs of wheels and in other places where splitting is to be avoided. It is an ornamental tree in England.

BLACK HAWK (1767-1838). A celebrated chief of the Sac Indians. In 1788 he succeeded his father as head chief of the Sacs. In 1804 the Sacs and Foxes agreed, for an annuity of $1000, to give up to the United States their lands east of the Mississippi; but Black Hawk promptly repudiated this arrangement, and in the War of 1812 took part against the Americans. The cession of the disputed territory was again provided for by treaties in 1815 and 1816, the latter being signed by Black Hawk; and in 1823 the majority of the Sacs and Foxes, under Keokuk (q.v.), moved across the Mississippi, a new treaty being signed at Prairie du Chien, on July 15, 1830. When the whites began to occupy the vacated lands, Black Hawk threatened retaliation, and by crossing the Mississippi with a small force in June, 1831, precipitated the Black Hawk War. The Indians were defeated by General Dodge, near the Wisconsin River, on July 21, 1832, and by General Atkinson, at the Bad Axe River, August 1-2, and Black Hawk surrendered on August 27. He and nine other warriors were held for a time as hostages, and after being taken to several Eastern cities, were confined in Fortress Monroe until June 8, 1833. The Sacs and Foxes under Keokuk soon moved to a reservation near Fort Des Moines, where Black Hawk died, October 18, 1838. Consult: Patterson, *Life* (Boston, 1834); Drake, *Life* (Cincinnati, 1846). Also consult an article, "Story of the Black Hawk War," by Thwaites, in Vol. XII. of the *Collections of the Wisconsin Historical Society* (Madison, 1885—).

BLACK HAWK WAR. See BLACK HAWK.

BLACKHEAD. (1) A scaup-duck (q.v.). (2) A minnow (*Pimephales promelas*). (3) A minute blemish in the skin, making a dark spot; a comedo.

BLACKHEAD (so named because the disease affects the color of the head), or ENTEROHEPATITIS. A malignant, contagious disease of turkeys, due to the attack of a protozoan parasite (*Amœba meleagridis*). Birds attacked by the disease show loss of appetite, weakness, and emaciation. Diarrhœa is a pronounced and constant symptom. Discolorations of the head frequently occur in the acute stages. Young birds seem to be most susceptible to the disease. Little success has attended remedial treatment of blackhead. Reliance must be placed for the most part on prevention, for which purpose roosting-places and feeding-grounds should be thoroughly disinfected by means of carbolic acid or other chemicals. Blackhead appears chiefly in July and August, and at the approach of winter. Turkeys apparently resist the disease better in warm, dry weather than in wet weather.

BLACKHEATH. An elevated, open common, and a favorite holiday resort for Londoners, in Kent, England, 5 miles southeast of London, bordering on Greenwich Park. It covers 267 acres, commands a fine view of great extent, and being a healthful tract, many villas have been built on its margin. The Roman road to Dover crosses it. Blackheath was formerly the scene of several insurrections, including those of Wat Tyler (1381) and Jack Cade (1450), and was also a noted place for highwaymen. Consult Drake, *History of Blackheath* (London, 1886).

BLACK HILLS. A name applied at various times to different sections of country lying between the Missouri River and the Rocky Mountains, but now used only to indicate a mountainous region partly in northeastern Wyoming, but principally in South Dakota (Map: South Dakota, B 5). They cover a total area of about 6000 square miles, 1893 square miles of which have been set apart by the United States Government as a forest reserve. (See FOREST RESERVES.) They are drained and nearly surrounded by the two main forks of the Cheyenne River (q.v.). Their altitude ranges from between 2500 and 3000 feet at their base, to the summit of Harney Peak, 7216 feet in height. The mountains were formed by a local uplift, which raised the Archæan and later formations into a concentric fold. The Black Hills district was first partly explored in 1874 by an expedition under General Custer, when gold was discovered. In 1876, after some hostilities, a treaty made with the Sioux Indians opened the country to settlement, and Deadwood, Central City, Lead City, and other towns grew up very rapidly. The Black Hills constitute one of the richest gold-mining districts in the United States. Silver, copper, tin, and iron ores also occur within their

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limits, besides coal, salt, petroleum, mica, gypsum, and building-stone. About one-third of the area is covered with dense dark forests of pine, whence the name, while deciduous trees are abundant. The climate is salubrious, the soil fertile, and the hills are well adapted to grazing purposes. See SOUTH DAKOTA.

BLACK HOLE. An appellation familiarly given to a dungeon or dark cell in a prison. The name is generally associated with the horrible confinement of a party of English in an apartment called the 'Black Hole of Calcutta,' on the night of June 20, 1756. The garrison of the fort connected with the English factory at Calcutta was captured by the Nawab Siraj-ud-Daula, who caused all of the prisoners taken, 146 in number, to be confined in an apartment 20 feet square. This cell had only two small windows, obstructed by a veranda. The crush was dreadful; and after a night of excruciating agony from pressure, heat, thirst, and want of air, there were in the morning only 23 survivors. One of them, Mr. John Z. Holwell, published a narrative of their sufferings in 1758. See HINDUSTAN; also Macaulay's essay on Clive.

BLACK HORSE (a fish). The Missouri or gourd-seed sucker (*Cycleptus elongatus*), usually about two feet long, "a peculiar species with small head, elongate body, and jet-black coloration, which comes up the smaller rivers tributary to the Mississippi and Ohio in large numbers in the spring." See SUCKER.

BLACK'IE, JOHN STUART (1809-95). A Scottish philologist. He was born in Glasgow in 1809, but received his early education in Aberdeen, where his father was agent for a bank. After going through the usual course of a Scotch university education—partly at Marischal College, Aberdeen, partly at Edinburgh—with a view to the Church, he went in 1829 to Germany, and studied for some time at both Göttingen and Berlin. He thus acquired a mastery of German, and an acquaintance more extensive than ordinary with the literature of that language. On his return, having abandoned the thought of entering the Church, he began the study of law, and passed as advocate at the Edinburgh bar in 1834. But he soon found the practice of the profession uncongenial, and devoted himself henceforth to literary pursuits. Among his earliest productions was his translation, into English verse, of Goethe's *Faust* (1834). He wrote also about this period numerous articles in the *Foreign Quarterly Review*, the *Westminster*, *Blackwood*, and *Tait*, chiefly on German subjects. In 1841 he was appointed by the Crown to the chair of humanities in Marischal College, which he held until, in 1852, he was elected to the Greek chair in the University of Edinburgh. From the beginning of his professorial career he had been incessant in advocating educational reform in Scotland, and took an active part in the movement that led, in 1859, to the remodeling of the Scottish universities. During 1874-76 he advocated throughout the country, with great enthusiasm, the foundation of a Celtic chair in Edinburgh University, and was successful in raising upward of £14,000 for its endowment. Of works of a professional and philological kind may be mentioned the lectures *On the Studying and Teaching of Languages; On the Rhythmical Declamation of the Ancients; The Pronunciation of Greek; Accent and Quantity* (1852). Among the most matured and scholarly of his productions is his metrical translation, with notes, of the dramas of Æschylus (1850). In 1853 he spent above three months in Athens acquiring a knowledge of the modern language; and as fruits of the visit there appeared articles on the subject in the *North British* and *Westminster* reviews. In 1866 he published *The Iliad of Homer*, translated into English verse, with commentary and introductory dissertations, in which he endeavored to present Homer to the English reader as a popular singer. He resigned his professorship in 1882 and died March 2, 1895.

Besides his works on philological and educational subjects, Blackie made excursions into other fields. In 1858 he published a treatise on *Beauty*, in refutation of Lord Jeffrey's association theory. Others of his works are *Lays and Legends of Ancient Greece, with other Poems* (1857); *Lyrical Poems* (1860); *Musa Burschicosa* (1869); *War Songs of the Germans*, a translation (1870); *Four Phases of Morals* (1871); *Songs of the Highlands and Islands* (1872); *Self-Culture* (1873); *Horæ Hellenicæ* (1874); *Songs of Religion and Life* (1876); *Natural History of Atheism* (1877); *Lay Sermons* (1881); *The Wisdom of Goethe* (1883); *Life of Burns* (1887); *Essays on Subjects of Moral and Social Interest* (1890).

BLACKING. A preparation employed for producing a black, glazed, shining surface on leather. There are numerous recipes for making blacking, but they all involve the use of a pigment, which is usually ivory-black, bone-black, or lampblack, mixed with a vehicle which is usually some combination of oil, vinegar, beer, molasses, water, and hydrochloric or sulphuric acids. Blacking intended for harness usually has glue, gelatin, gum arabic, or some resinous compound added to the vehicle. The fact that the addition of sulphuric acid to ivory-black and sugar produces sulphate of lime and soluble acid phosphate of lime, which makes a tenacious paste, is the foundation of many of the compositions used as blacking. The famous English blacking known as Day & Martin's consists of bone-black, sperm-oil, molasses, vinegar, and sulphuric acid. These ingredients, when mixed together in the order named, produce a thick, tenacious paste, which is liquefied by the addition of vinegar, and put into stoneware bottles. A familiar recipe for a liquid blacking is as follows: Five ounces of ivory-black; 4 ounces of treacle; ¾ ounce of sweet oil; triturate until the oil is thoroughly mixed in, then add one pint each of vinegar and beer-lees. A paste blacking which may be easily made consists of ivory-black, 4 pounds; molasses, 3 pounds; hot sperm-oil, 9 ounces; gum arabic, 1 ounce, and vinegar, 12 ounces. These ingredients are mixed together and allowed to stand for about a week, with an occasional stirring, when the blacking is ready for use. By adding more vinegar the compound may be liquefied. A well-known recipe for harness-blacking is as follows: Beeswax, 1 pound; ivory-black, ¼ pound; Prussian blue, 1 ounce; ground in 2 ounces of linseed oil; oil of turpentine, 3 ounces; copal varnish, 1 ounce; mix well together and form into cakes while warm. In founding (see FOUNDING) the name 'blacking' is given to various washes of powdered charcoal, sea-coal, or graphite with which the surfaces of

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models are coated to give the casting a smooth surface and to prevent the molten metal from penetrating the same.

BLACK-JACK. The name given by miners to zinc blende, which is of black color. It was also the name applied in former times to a kind of drinking-flagon. For Black-Jack as the name of a tree, see OAK.

BLACK JACK. A nickname given, chiefly by his political opponents, to Gen. John A. Logan.

BLACK KNIGHT, THE. (1) The name of a character in the early romances, son of Oriana and Amadis of Gaul. (2) Richard Cœur de Lion was known in Scott's novel *Ivanhoe* as The Black Knight or The Black Sluggard, on account of the suit of black armor and the black shield he bore during his wanderings in England.

BLACK KNIGHT, COMPLAINT OF THE. A poem written by Lydgate, but erroneously included in some of the early editions of Chaucer.

BLACK LAW. In American history, a name applied to any one of a series of laws, passed in various border and Northern States before the Civil War, sharply discriminating against free negroes who wished to emigrate to such States and become citizens thereof. Thus, in some States, certificates of freedom were to be filed, negroes were to be rigidly excluded from the militia and from the public schools, and no negro was to testify in cases in which any white man was directly interested. More or less stringent laws were passed in Virginia, Maryland, Delaware, Mississippi, Indiana, Illinois, Iowa, Oregon, and New Mexico. Consult Wilson, *Rise and Fall of the Slave Power in America* (Boston, 1872-75).

BLACK LEAD. See GRAPHITE.

BLACKLEG (so named because the tumors affect the legs oftener than other parts of the body), BLACK QUARTER, or SYMPTOMATIC ANTHRAX. An infectious disease due to the action of *Bacterium chanvoli*. It is confined almost entirely to cattle, but cases have occurred also in sheep, goats, camels, pigs, and horses. Man is immune to it. The disease is characterized clinically by the development of tumors in the muscles of various parts of the body, producing, when stroked, a crackling sound, which serves to distinguish this disease from anthrax. After death the tumors become infiltrated with blood and serum containing gas-bubbles; and this again distinguishes blackleg from anthrax, as the tumors of the latter are not found to contain any gas. Further, in blackleg the spleen is not affected and the blood coagulates quickly, while in anthrax the spleen is much enlarged and the blood clots more slowly. Blackleg has long been known as a disease of cattle, but has, until within recent years, been generally confused with anthrax. The blackleg bacterium does not develop in the presence of free oxygen. In the blood it is slightly motile. The symptoms of blackleg are loss of appetite, debility, and great elevation of temperature. The disease runs its course very rapidly, and is fatal in nearly all cases. Cattle between the ages of six and eighteen months are most susceptible, young calves and old animals being more resistant. Fat cattle seem to be especially liable to infection. The symptoms appear suddenly within from one to three days after infection. The tumors may develop at once or may be preceded by the symptoms of fever and trembling. A lameness of the legs is usually observed, and is due to the muscular tumors which almost always accompany the disease. The animal manifests considerable pain, and falls to the ground soon after the development of the first symptoms. The part which is most affected becomes swollen and assumes a black or blue color, which is due to the infiltration and coagulation of blood within it. The dried spores of the blackleg bacterium may be carried in hay or other dry feed, and it is quite possible that animals may be infected by eating such material. Recent investigations, however, indicate that infection most frequently takes place through wounds of the skin, mouth, or tongue, such as would be produced by various spines and the awns of grasses.

Blackleg is found in nearly all countries of the globe. In the mountains of France it is known as *mal de montagne*, in Denmark as *rashsyge*, and in Germany as *Rauschbrand*. In the United States it is most prevalent in Texas, Kansas, Nebraska, South Dakota, and Colorado.

Medical treatment of blackleg has been uniformly unsuccessful and is not to be recommended. On the other hand, preventive vaccination has given very satisfactory results. Out of 500,000 cattle vaccinated in Europe, only one-half of one per cent. subsequently died of blackleg. Equally striking results have been obtained by the Bureau of Animal Industry of the United States Department of Agriculture. This bureau has perfected a method of producing immunity against blackleg by one vaccination, requiring less time than the old method, in which two inoculations were made, with an attenuated and strong vaccine, respectively. Stockmen may now buy the vaccine and inoculate their own cattle. For further study of blackleg, consult: A. J. Murray and others, "Special Report on Diseases of Cattle," *Report of United States Department of Agriculture* (Washington, 1892); *Bureau of Animal Industry, 15th Annual Report*, p. 27; Mocard and Leclainche, *Les maladies microbiennes des animaux* (Paris, 1898).

BLACK LETTER (Black Letter). A name commonly given in England and America to the printing-types which on the Continent are most generally known as Gothic. The first printed books imitated every peculiarity of the contemporary manuscripts; and as printing was first practiced in Germany and the Netherlands, the first types were copies of the letters in use in those countries in the middle of the Fifteenth Century. Two sorts of letters have been employed in the writings of Western Christendom. The Gothic style dates from about the middle of the Twelfth Century; the type which imitated it, first used c.1445, spread with the art of printing into most European countries, until the classical taste reverted to the more graceful letter known as Roman, which is a revival of what is known in palæography as the Caroline minuscule, of the kind used in the Eleventh and Twelfth centuries. Aldus attempted in 1501 to supersede the Roman letters by what have been called Aldine or Venetian, but are best known as Italic characters. These can scarcely be said to have come into much more than temporary or exceptional use; but the Roman letters in no long time spread from Venice all over the west of Europe. Although thus supplanted in general

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use, the Gothic or Black Letter was long retained for special purposes, such as the printing of Bibles, prayer-books, proclamations, and acts of Parliament. Characters similar to the Black Letter still continue to be used in Germany, but of late there has been a movement (based largely upon the damage to eyesight from reading the old character) in favor of a general adoption of the Roman letter. For specimens of all the types used in England in the Fifteenth Century, consult Duff, *Early English Printing* (London, 1896).

BLACK LILY. See FRITILLARY.

BLACK LIST. A list of persons either (1) against whom the compiler would warn others, or (2) with whom he refuses to have business transactions, or (3) with whom he seeks to induce others not to have business relations. An example of the first class in England is the official list of defaulters on the Stock Exchange; in the United States, the list of those against whom unsatisfied judgments are standing, or who have given chattel mortgages on stock in trade, or whose credit is poor. These and similar lists are published by mercantile agencies and others, and are considered not only valuable to the business community, but perfectly fair and lawful. And yet printing a person's name in such a list may subject the publisher to an action for libel. In order to defend successfully such an action, the publisher must prove that the statement made in the list about the plaintiff was true, or else that it was a correct transcript of a public record, or a fair and accurate report of a judicial proceeding, or that it was made upon a privileged occasion. Such a statement is privileged when it is made in answer to questions by persons having a legitimate reason for asking them; as when A, to whom B has applied for credit, inquires about B's financial condition. An example of the second class of black lists is one kept by a railroad company of persons dismissed from its employment for incompetency, discourtesy to patrons, or other cause, in order that its agents may not reëngage them. The third class is illustrated by lists, kept by manufacturers or dealers forming an association or combination for the control of a particular line of business, of those who refuse to come into the association; or by lists kept by labor unions of non-union workmen or of those employing such workmen, with a view of terrorizing the workmen or of boycotting the employers. In some States the last-mentioned form of blacklisting constitutes a statutory crime. Consult the authorities referred to under the titles LIBEL and CONSPIRACY; and Eddy, *Law of Combinations* (Chicago, 1901).

BLACKMAIL (*black* + *mail*, a small piece of money, rent, tribute, Fr. *maille*, OF. *maaille*, LLat. *medalia*, medal). A term which has three distinct significations in English law: (1) It was applied to rents received in work, grain, or baser money, as distinguished from rents received in silver or white money (*mailles blanches*). See RENT. (2) It was applied to the tribute levied by freebooters, in the four northern counties of Northumberland, Westmoreland, Cumberland, and Durham. By 43 Eliz., ch. 13, sec. 1 (1601), it was made a felony without benefit of clergy to pay or receive this tribute, or blackmail, and similar legislation was enacted in Scotland. The practice does not appear to have ceased until after the legislative union of Scotland and England. (3) At present it is applied both in England and the United States to the offense of attempting to extort money or property by threats of various kinds. These threats are usually to accuse a person of a crime, or to injure his person or property, or to defame him, or to impute to him some deformity or disgrace. As a rule, it is no defense that the person threatened with the accusation is guilty, nor that the attempt at extortion fails. The criminality of the offense consists in its tendency to induce a breach of the peace, and in some cases its tendency to pervert justice. By some statutes, only written threats made for the purposes of blackmail are punishable criminally. Consult the authorities referred to under CRIMINAL LAW.

BLACK MAN, THE. A name popularly used for the devil; more commonly, The Man in Black.

BLACK'MAR, FRANK WILSON (1854—). An American economist and educator; born at West Springfield, Pa. He was educated at the University of the Pacific (College Park, San José, Cal.), and at Johns Hopkins, where he was an instructor in history in 1887-88, and fellow in history and politics 1888-89. From 1889 to 1899 he was professor of history and sociology at the University of Kansas, and was appointed to the chair of sociology and economics there in the latter year. In 1897 he organized the graduate school of the university, and was elected its dean. He was at one time prominent in the promotion throughout the West of the university extension movement, and has spoken and written extensively on topics of history, economics, and sociology. His publications include *Spanish Colonization* (1890); *Spanish Institutions in the Southwest* (1891); *History of Higher Education in Kansas* (1900); and *Charles Robinson, the Free-State Governor of Kansas* (1900).

BLACK MONDAY. A name applied to any Monday marked by a memorable disaster. Two such days occurred within a short period of English history, and both, by a curious coincidence, were Easter Mondays. In 1351 there was a tremendous hail-storm, and many people perished from cold. Nine years later, when the army of Edward III. was lying before Paris, another severe storm cost the lives of a large number of men and horses. The impression of these calamities was so lasting that Shakespeare used the expression colloquially (*Merchant of Venice*, Act V., Scene 5).

BLACK MONKS. See AUGUSTINIANS.

BLACK'MORE, Sir RICHARD (c.1650-1729). One of the court physicians in the reigns of William III. and Anne. He is remembered as the most heavy and voluminous poetaster of his time. Besides numerous essays, Blackmore wrote at least six long epic poems: *Prince Arthur*, *Eliza*, *Alfred*, *The Redeemer*, *Nature of Man*, and *The Creation*. The last-named was pronounced by Addison to be "one of the most useful and noble productions in our English verse." It was also praised by Johnson. But few modern readers are likely to agree with these judgments. Blackmore, who appears to have been a good and well-meaning man, was ridiculed without mercy by Pope and other wits of the time. His poems are really worthless. Consult: Johnson, "Blackmore," in *Lives of the Poets* (London,

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1779-1781); the *Spectator*, No. 339; and the *Dunciad*, Bk. II., 259-268 (London, 1729).

BLACKMORE, RICHARD DODDRIDGE (1825-1900). An English novelist. He was born at Longworth, Berkshire, June 7, 1825; the son of Rev. John Blackmore. Graduating from Exeter College, Oxford, in 1847, he was called to the bar five years later, and practiced as a conveyancer till his health failed. He then took up fruit-growing at Teddington, a little way up the Thames from London. He died at Teddington, January 20, 1900. He began his literary career as a poet, publishing *Poems by Melanter* (1853); *Epullia* (1854); *The Bugle of the Black Sea* (1855); *The Fate of Franklin* (1860); and a translation of Vergil's *Georgics* (complete in 1871). His first novel, *Clara Vaughn*, appeared in 1864. It was followed by *Cradock Nowell* (1866); *Lorna Doone* (1869); *The Maid of Sker* (1872); *Alice Lorraine* (1875); *Cripps the Carrier* (1876); *Erema: or, My Father's Sin* (1877); *Mary Anerley* (1880); *Christowell* (1882); *Remarkable History of Sir Thomas Upmore* (1884); *Springhaven* (1887); *Kit and Kitty* (1889); *Perlycross* (1894); *Fringilla* (1895); *Tales from the Telling-House* (1896); and *Dariel* (1897). Though Blackmore thought some of his other books better and more interesting than *Lorna Doone*, his reputation as a novelist rests almost wholly upon this romance of the Seventeenth Century. It abounds in beautiful descriptions, is elevated in tone, and is written in a rhythmic prose which is rare in our literature. It has made famous Exmoor and the neighboring district, the home of the Doones.

BLACK MOUNTAINS. A mountain group in Buncombe and Yancey counties, North Carolina, forming a spur of the Blue Ridge and a part of the Appalachian system (Map: North Carolina, B 4). They lie between the French Broad River and its main tributary, the Noliducky, and have a northwest and southeast trend transverse to the main line of the Blue Ridge elevations. The Black Mountains are the culminating points of the Appalachian system. Mount Mitchell, the highest peak, is 6710 feet, and Guyot's Peak, Sandoz Knob, Hairy Bear, Cat-Tail Peak, Gibbe's Peak, and Mitchell's Peak are more than 6500 feet above the sea. They form the divide between the Tennessee and Catawba river basins. Their slopes are forested with evergreens, while their valleys in places contain rich soil that is well adapted for agricultural purposes. See APPALACHIANS and BLUE RIDGE.

BLACK OAK. See OAK.

BLACKPOOL' (so named from a pool now drained; Irish and Gael. *poll*, hole, pit, bog, AS. *pōl*, Ger. *Pfuhl*, pool, puddle). A flourishing town and popular watering-place of Lancashire, England, on the Irish Sea, about 18 miles west-northwest of Preston. It is sometimes called the 'Brighton of the North' (Map: England, C 3). It has an excellent bathing and promenade beach, a fine esplanade, three piers, a winter garden and pavilion, an aquarium, several theatres and music-halls. The principal streets and piers are lighted by electricity. Blackpool was incorporated in 1876. Its water-supply is obtained from the Fylde water-works, managed by a board composed of representatives from Blackpool and three other towns. The town owns its gas-works, electric-light plant, markets, slaughter-houses, and cemeteries. It also owns and operates its street railways by the overhead trolley system, and has a line connecting Blackpool with Lytham, another favorite bathing-place, and Saint Anne's-on-the-Sea. There is a technical school, and a so-called continuation school, three public libraries, and a hospital. A branch railway connecting Blackpool with the Preston and Wyre Railway affords easy access from Preston, Liverpool, Manchester, and all parts of the kingdom. Blackpool is annually visited by over 100,000 tourists. Population, in 1891, 23,846; in 1901, 47,346.

BLACKPOOL, STEPHEN. A weaver in Charles Dickens's *Hard Times*. He was wrongly suspected of Tom Gradgrind's crime of robbing the bank of £150. His love for Rachel, a 'hand' in Bounderby's mill, is one of the most touching elements in the story.

BLACK PRINCE. The name usually given in history, on account of the color of his armor, to Edward, Prince of Wales, son of Edward III. (q.v.), the victor at the battle of Poitiers. He died in 1376. His son ascended the throne in 1377, as Richard II.

BLACK-QUARTER. See BLACKLEG.

BLACK RAIN. Showers of black rain have been recorded on many occasions in Ireland, and less frequently in other portions of Europe. The blackness comes from various sources, such as the soot from city fires and especially forest fires, which is washed down by rain; black fungi or fungus-spores — such as produce smut, mildew, and rust—carried up by gusts of wind and subsequently falling with the rain. In a few special cases the spores of fungi, after being wetted by the rain, grow rapidly on the ground and produce a black coating, which has not necessarily fallen with the rain, but is often spoken of as black rain. See DUST, ATMOSPHERIC.

BLACK RIVER. A river in northern New York, rising in the southwestern part of the Adirondack region and flowing southwest, then northwest, 130 miles through Herkimer, Oneida, Lewis, and Jefferson counties to Black River Bay, at the extreme eastern end of Lake Ontario (Map: New York, E 2). Numerous falls and rapids, with great possibilities for development, furnish abundant water-power to half a dozen villages and the city of Watertown. From Lyons Falls to the mouth of the river, a distance of 72 miles, the fall is about 500 feet. Boats pass from this river just above Lyons Falls to the Erie Canal at Rome, N. Y., through the Black River Canal.

BLACK RIVER, or BIG BLACK. An affluent of White River, which, rising in Reynolds County, Mo., and flowing through Missouri, bends toward the southwest, enters Arkansas, and joins the White River a few miles above Newport, Jackson County (Map: Missouri, F 5). It is about 170 miles long, and navigable for about 100 miles, except in the dry season. Valuable timber is found along its banks, and the lower regions produce good crops of cotton.

BLACK RIVER FALLS. A city and the county-seat of Jackson County, Wis., 171 miles northwest of Milwaukee; on Black River, and on the Chicago, Saint Paul, Minneapolis and Omaha Railroad (Map: Wisconsin, C 4). It contains a public library. Falls on the Black River afford

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extensive water-power, and in the vicinity are iron-mines and deposits of kaolin, which are utilized in the manufacture of firebrick. The city has also flour and lumber mills, plow and wagon and patent-medicine factories, brewery, foundry and machine-shops, and nurseries; and is the commercial centre for a large agricultural district. Population, in 1890, 2261; in 1900, 1938.

BLACK ROCK, Conn. See BRIDGEPORT.

BLACK ROD, USHER OF THE (so called from the staff he carried). An officer of the House of Lords. He is chief gentleman usher to the Sovereign, and belongs to the Order of the Garter. His principal duty is to summon the House of Commons to the Lords when the royal assent is given to bills, or when royal speeches are read; and to take into custody any peer guilty of breach of privilege. The office also exists in the self-governing British commonwealths of Canada, Australia, and Cape Colony.

BLACK ROOD OF SCOTLAND (*Rood*, a representation of Christ crucified, AS. *rōd*, cross, akin to OS. *rōda*, Dutch *roede*, rod). A famous relic brought to Scotland in 1070 by Margaret, wife of King Malcolm. It consisted of a piece of the true Cross, set in an ivory image of the Saviour, and was held in the highest veneration by the Scotch kings. It fell into the hands of the English during the invasion of that country by David II. in 1346.

BLACK ROT. See GRAPE.

BLACK SALSIFY. See SCORZONERA.

BLACK SATURDAY. A name given to August 4, 1621, in Scotland, because of Parliament's favorable legislation regarding Episcopacy. A fearful storm is said to have been in process during the session. The name has also been given to September 10, 1547, the day of the battle of Pinkie.

BLACK SEA (Lat. *Pontus Euxinus*, Gk. Πόντος Εὔξεινος, *Pontos Euxeinos*, hospitable sea, originally ἄξεινος, *axeinos*, inhospitable; Turk, *kara den giz*, black sea). An inland sea lying between eastern Europe and Asia Minor, and connected with the Mediterranean by the Bosporus, the Sea of Marmora, and the Dardanelles (Map: Europe, G 4). It is bounded on the north by European Russia; on the east by Caucasia; on the south by Asia Minor; on the west by European Turkey, Bulgaria, Rumania, and Russia. It has a length from east to west of about 750 miles, a greatest width of 380 miles, and covers an area (not including the Sea of Azov) of about 165,000 square miles. The Crimean Peninsula projects into the Black Sea from the north, forming the Sea of Azov and the Gulf of Perekop. The former is almost entirely cut off from the Black Sea, and is very shallow. The Black Sea is very deep; the floor of a great part of the central basin lies more than 6000 feet below the surface, and the greatest depths considerably exceed 7000 feet. The Black Sea receives the drainage of a large part of Central Europe through the Dnieper, Dniester, Bug, and Danube; of a considerable section of eastern Russia through the Don (which flows into the Sea of Azov); of the western Caucasus region through the Kuban and a number of smaller rivers; and of northern Asia Minor through the Tchoruk, the Yeshil Irmak, the Kizil Irmak, and the Sakaria. Tidal action is scarcely perceptible, but the sea-level rises and falls with the increase and decrease in volume of the tributary waters. There is a strong surface current setting toward the Bosporus, and an undercurrent flowing in an opposite direction from the Ægean Sea. The latter current is heavy and saline, and to its agency is due the phenomenon that the waters of the Black Sea contain nearly 2 per cent. of salt, although constantly fed by large rivers. The Black Sea is visited by severe storms of both local and general character. On the north shore the southerly winds are most dreaded, while near the Bosporus the so-called *boras* from the northeast are particularly violent. The climate, notwithstanding its southern position, is marked by considerable severity. In winter heavy fogs form, which obscure the sunlight and lend a dark aspect to the waters, thus partially justifying its name. The Black Sea is of great economic importance to the Russian Empire, as it furnishes an outlet for the extensive agricultural region of the south. Communication is maintained with the Caspian Sea by a railway from Baku to Batum, between which points there is also a pipe-line for the transport of petroleum. The principal ports on the Black Sea are Odessa, Poti, and Batum, in Russian territory, and Trebizond, in Turkey. There are no islands worthy of mention.

BLACK SILVER. A name given, on account of its color, to the mineral stephanite, which is a silver sulphantimonite found in Saxony, Mexico, Nevada, and elsewhere, and valued as an ore of silver.

BLACKSNAKE, or BLUE RACER. A common colubrine serpent (*Zamenis* [formerly *Bascanium*] *constrictor*), prevalent over all parts of the United States and the adjacent borders of Canada. It is slender in form, but rarely if ever exceeds 6 feet in length. The color of Eastern adults is uniform, lustrous pitch-black above and slate-color beneath, sometimes tinged with greenish white; lower jaw, chin, and sometimes edges of the upper-lip plates, white; tongue, black. Specimens from the West and Southwest exhibit a more or less bright olive-green, with the whole under surface greenish-white to bright yellow; hence the Western names 'blue racer' and 'green racer.' The young under about 18 inches long are variegated with dark blotches upon dusky olive, with light margins on the scales, especially along the sides. This is one of the most ubiquitous, numerous, and vigorous of American snakes. It is at home on the ground, where it runs with amazing swiftness; but it is also an expert climber, scaling large trees and searching their topmost branches, perhaps 100 feet above the ground, with as great ease as it explores bushes and rocks; it will leap more than its own length from tree to tree when in haste. It is also a swift and powerful swimmer, and seeks much of its food in swamps and along streams. Its food consists mainly of frogs, toads, other snakes, small mammals, birds and their young, and eggs, together with some insects. These are captured by a stealthy approach and swift stroke or chase, and more often by night than by day. It is very useful to the farmer in destroying great numbers of moles and mice, but also is the most indefatigable and successful searcher for birds' nests.

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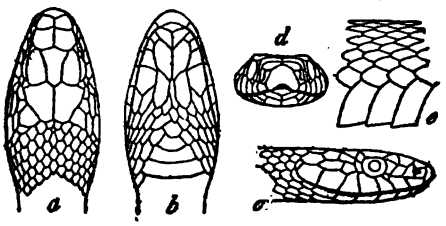
Objects of special animosity are the copperhead and rattlesnake, whose trail it follows by scenting, like a dog; and having overtaken one of these sluggish reptiles it leaps upon it, avoiding the stroke by its swiftness, catches it by the back of the neck, and wrapping itself about it, crushes, bites, and shakes the life out of it, after which it swallows it whole. "The constricting power of the blacksnake," according to Cope (*Report United States National Museum*, 1898, p. 795), "is not sufficient to cause inconvenience to a man, but might seriously oppress a child. The pressure exercised by a strong individual wound around the arm is sufficient to . . . cause the muscles to ache, but it is easy to unwind the snake with the free hand and arm. The blacksnake is harmless, and its bite, which it rarely inflicts, only amounts to a serious scratch. . . . It is courageous, and will sometimes attack, moving forward with the head raised one to two feet above the ground. It, however, quickly turns about and runs if the enemy preserves a bold front." Large ones are easily killed by quite small dogs, and among its enemies are all the carnivora, especially, perhaps, the skunk and badger. It is inclined to frequent a limited area continuously.



THE BLACKSNAKE.

a, top of head; *b*, under side; *c*, profile; *d*, face; *e*, arrangement of body-scales.

These serpents hide away in hollow stumps and underground dens at the approach of cold weather, where often several will entangle themselves into a ball for mutual comfort and remain torpid until spring. They breed during the summer, the female—which is larger and darker than the male—laying 15 or 20 eggs in a hollow in a sunny bank, or amid the dry dust of a decaying stump, or perhaps within an old dungheap, and remaining near until the young hatch, when she takes charge of them and defends them until they have reached a considerable size. This snake is tamable, but individuals differ in temperament and docility, some showing much intelligence and kindliness, while others are irascible. Several other species of the genus belong to the Southwestern United States, Mexico, and the West Indies, and the Texan whipsnake (q.v.) is a near relation. The chain-snake is sometimes called 'mountain blacksnake.' Other blackish serpents known as blacksnakes include a colubrine of Jamaica (*Ocyophis ater*), the death-adders (q.v.) of Australia and Tasmania, and some others, notable for dark hues.

BLACK SNAKEROOT. See COHOSH.

BLACK'STONE'. A town in Worcester County, Mass., 2 miles northwest of Woonsocket, R. I.; on the Blackstone River and on the New York, New Haven and Hartford Railroad (Map: Massachusetts, D 3). It has a public library and extensive manufactures of cotton, woolen, rubber, and felt goods. The government is administered by town-meetings held three times a year to pass on matters relating to appropriations, bridges, highways, etc. Settled about 1700, Blackstone was separated from Mendon in 1845, and named in honor of William Blackstone, the first settler on the site of Boston. Population, in 1890, 6138; in 1900, 5721. Consult *History of Worcester County* (2 vols., Boston, 1879).

BLACKSTONE, WILLIAM (? -1675). An early colonist in New England. He was the first white man to settle on the site of Boston, Mass. (1623), but sold his land in 1634 and became the first white settler within the limits of the present Rhode Island. Consult Winsor, *Memorial History*, Vol. I. (Boston, 1880).

BLACKSTONE, Sir WILLIAM (1723-80). A celebrated commentator on English law. He was the son of a silk mercer in London, and was born there July 10, 1723. At the age of 15, having obtained a scholarship from the Charterhouse School, where he was educated, he was sent to Pembroke Hall, Oxford. There he was fortunate enough to obtain a second scholarship, and remained till, in 1744, he was admitted a fellow of All Souls' College. During this period he divided his time between Oxford and London, attending the courts of law with the view of qualifying himself for his future profession. In 1746, at the age of 23, he was called to the bar, but failed to attract either notice or practice. In 1749 he was appointed recorder of Wallingford, in Berkshire; but in 1753 he went to Oxford, where he delivered a course of academic lectures upon the law of England. A few years later, a Mr. Viner, himself a legal author, having left a sum of money to endow a chair of English law in the University of Oxford, Blackstone was in 1758 appointed first Vinerian professor. The following year Blackstone returned to Westminster; and as the doctrines which he had taught as a lecturer had been such as to commend him to the notice of the Tory Government of that day, he obtained its patronage, and in 1761 was made a King's Counsel. Shortly after he was appointed principal of New Inn Hall, Oxford. Other honors followed fast, and he became successively member of Parliament, bencher of the Middle Temple, and Solicitor-General to the Queen. In 1765 Blackstone published the first volume of his lectures, and the remaining three volumes between that date and 1769. These lectures form his celebrated *Commentaries on the Laws of England*. His practice continuing to increase, he resigned, in 1766, his Oxford appointments. Four years later he was offered the solicitor-generalship, and after declining it was knighted and made a justice of the court of common pleas. The remaining years of his life were spent in the discharge of his duties as a judge. He died February 14, 1780, at the age of 57.

The fame of Blackstone rests entirely upon his *Commentaries*. His other literary works were inconsiderable, and his merits as a pleader or judge were not such as, of themselves, to have made his reputation outlive him. As a commentator he had many excellences. His style was in general clear and gracefully ornate, and his illustrations pleasing and felicitous. So long as he confined himself to exposition—to the accurate statement in scholarlike English of

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what had heretofore lain buried in the cumbrous language of lawyers like Littleton—Blackstone was unsurpassed, and rendered an important service to the country. But he was ambitious of combining with this exposition the higher task of explaining the reasons for the law, as well as its merits and defects. For this survey of the law, from the legislator's point of view, he had not the requisite qualifications. His knowledge of English history was, as Hallam tells us, superficial, and his study of the philosophy of law had been imperfect. With the works, indeed, of Montesquieu and Beccaria he was acquainted; but the mode in which he quotes them shows that he had imbibed nothing of their spirit. The method followed in the *Commentaries* was as unscientific as could be imagined, and had not even the merit of originality. It was taken, with little alteration and no improvement, from Sir Matthew Hale's *Analysis of the English Law*. Possibly the haste with which the *Commentaries* must have been composed, being originally in the form of lectures, may have led to some of their imperfections. Notwithstanding its defects, the positive merits of the work—its systematic character, its comprehensiveness, the accuracy of its exposition, and the dignity and charm of its style—have made it the best-known, and in many respects the most influential treatise in English law. All subsequent commentaries, including that of Kent, have been modeled upon it, and it continued to be for a hundred years the foundation of all legal education in America. Numberless editions of the *Commentaries* have been printed, including those of Chitty, Christian, Cooley, Sharswood, and, last and best of them all, the admirable edition of Lewis published in 1898. As a century has elapsed since the *Commentaries* were composed, so many alterations are requisite to adapt them to the existing state of the law, that it may be said that their purpose has been served, and that they are now valuable chiefly as materials for history.

Consult: His Life, by Clitherow, prefixed to Blackstone's *Reports of Cases*, etc. (London, 1781); also his Life, in *The Law Magazine*, Vol. XV. (London, 1836); and his Life in *The Dictionary of National Biography*, Vol. V. (London, 1886).

BLACKSTONE EXAMINATION. See GLASGOW UNIVERSITY.

BLACK STONE OF MEC'CA. A sacred stone in the Kaaba at Mecca, of which legend tells that it was given by an angel to Abraham, and that it was originally white, but became blackened by the sins of mankind. The stone is probably a meteorite.

BLACKSTONE RIVER. A river of Massachusetts, rising near Worcester, flowing southeast through Rnode Island, and emptying into the Providence River, near Providence. In the upper part of its course the river flows through a series of small lakes and ponds. Below Pawtucket it is known as the Seekonk. It is the most important river of eastern New England south of the Merrimac, and is noted for the amount of power it furnishes, there being along its banks a succession of mills. It is about 50 miles long, and drains above Pawtucket an area of 458 square miles. It falls over 400 feet from Worcester to the sea.

BLACKTAIL. An American deer, notable for its black tail: (1) The mule-deer (q.v.). (2) The Columbian deer (*Odocoileus Columbianus*) of the coast region, from central California to Alaska. It is one-third smaller than the mule-deer, but has similar antlers. In summer it is reddish, but in winter brownish-gray, mottled with black, darkest along the spine. "Top of head chestnut and black; black stripe over the eyes, meeting on forehead; chin white, behind is a black patch; face gray; upper throat, posterior portion of under parts, and base of tail, white; rest of under parts mottled similarly to the back; chest sooty; legs dark cinnamon, inner side white; tail above black, . . . beneath, white" (Elliot). Alaskan specimens are paler. This deer exists only between the mountains and the coast, and frequents the forested foothills and valleys covered with chaparral, where it is tolerably abundant. Its habits are similar to those of the mule-deer. Consult: Farrell, in Shields's *Big Game of North America* (Chicago, 1890); Van Dyke, in *The Deer Family* (New York, 1902); and bibliography under DEER.

BLACKTHORN. See CRATÆGUS.

BLACK TIN. A name applied to tin ore ready for smelting. See TIN.

BLACK-VARNISH TREE. See MELANORRHŒA.

BLACK VOMIT. The dark matter vomited in yellow fever, usually a sign of fatal termination of the disease. It is in part coagulated blood. The fever itself is sometimes called the 'black vomit.' See YELLOW FEVER.

BLACK WAD. Native black *pyrolusite* or *wad*, so called by miners in Great Britain.

BLACK'WALL. Part of Greater London. For Blackwall Tunnel, see LONDON.

BLACK WALNUT. See WALNUT.

BLACK WARRIOR (from the Choctaw name *Tuscaloosec*). (Map: Alabama, B 2). A river of Alabama, formed by the junction of several large streams in Walker County: Sipsey fork, coming in from the northwest; and Mulberry and Locust forks, from the northeast. It flows southwest, joining the Tombigbee River near Demopolis in the west central part of the State. It is navigable to Tuscaloosa, above which city it has a considerable fall and furnishes extensive water power.

BLACK WARRIOR, THE. An American merchant vessel, which, touching at Havana in February, 1854, on its way from Mobile to New York, was seized by the Cuban officials for violating the customs regulations of that port. Her cargo was confiscated, and her captain heavily fined, in spite of the protests of the American consul. The affair caused great excitement in the United States, especially in the South, and was the subject of a spirited correspondence between the American and Spanish governments. Had it not been for the strong feeling aroused throughout the North at that time by the debates over the Kansas-Nebraska Bill (q.v.), it is possible that the slave power, desirous of obtaining Cuba, would have succeeded in forcing the Administration to use this as a pretext for a war of conquest against Spain. Spain finally restored the confiscated cargo and remitted the captain's fine. For a good account of the negotiations over the *Black Warrior* incident, con-

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sult Rhodes, *History of the United States from the Compromise of 1850*, Vol. II. (New York, 1893). Also, for much material on the incident, consult House Document No. 86, *Case of the Black Warrior and Other Violations of the Rights of American Citizens by Spanish Authorities* (Washington, 1854).

BLACK WATCH. A famous Highland regiment in the British Army. In 1688 the Earl of Athole was commissioned to organize a guard for the maintenance of peace in the Highlands. They were known as the *Freiceadan Dubh*, and wore a dark-colored tartan, which distinguished them from the *Saighdean Dearg*, or 'red soldiers,' as the regular troops were called. The different companies were engaged in the military police work, for which they were formed, until 1739, in which year they were regularly organized into the 42d Regiment of the Line. Their war history begins at Fontenoy, and few regiments in the British service excel them in the number and character of their battle honors. See HIGHLANDERS.

BLACK WATER. See TEXAS FEVER.

BLACKWATER. The name of several rivers and streams in Great Britain and Ireland. The most important are: (1) The Blackwater of Cork County, which rises in the west of Kerry County, flows past Millstreet, Mallow, Fermoy, Lismore, and Cappoquin, and enters the sea at Youghal Harbor (Map: Ireland, C 4). It has a course of 100 miles; is the seventh in size of the Irish rivers; abounds in salmon, and is navigable for barges for the last 15 miles of its course. (2) The Blackwater of Ulster, 50 miles long, which rises on the confines of Tyrone and Fermanagh counties, runs past Caledon and Charlemont, and falls into the southwest corner of Lough Neagh. (3) The Blackwater of Essex, England, 40 miles long, which rises in the northwest of the county, flows past Coggeshall to Maldon, where it becomes an estuary opening into the North Sea.

BLACK-WATER STATE (Nebraska). See STATES, POPULAR NAMES OF.

BLACKWELL, ANTOINETTE LOUISA BROWNE (1825—). An American minister and author, born at Henrietta, N. Y., and educated at Oberlin College, Ohio. In 1853 she was ordained pastor of the Congregational church at South Butler, N. Y., and discharged her parishional duties for two years, when ill health compelled her to resign. Afterwards she devoted herself to the exposition of philosophical views in literary form. Her principal works are: *Studies in General Science* (1869); *The Sexes Throughout Nature* (1875); *The Physical Basis of Immortality* (1876); and *The Philosophy of Individuality* (1893).

BLACKWELL, ELIZABETH (1821—). The first woman who ever obtained a medical diploma in the United States. She was born in Bristol, England. Circumstances induced the family to emigrate to New York, and they afterwards went to Cincinnati. Miss Blackwell in 1838, with two elder sisters, opened a boarding-school, which soon had a large attendance. She, however, chafed at the limitations which society had imposed on women. At length, in 1844, the school was given up, Miss Blackwell determining to become the medical apostle of her sex. After three years' further work as a teacher, during which time she devoted the whole of her leisure to the study of medical and anatomical books, she went to Philadelphia, where she applied in vain for admission into the medical schools. Failing this, she entered on a course of private anatomical study and dissection and of midwifery, with Professor Allen and Dr. Warrington of Philadelphia. After strenuous efforts, she at last obtained admission to Geneva Medical College, Geneva, N. Y., in 1847. From this college she graduated with the highest honor in 1849. During the two years of her study, she conducted herself with a propriety and discretion that gained for her the esteem and respect of all her fellow-students. Her 'brilliant example,' as the president called it, had stimulated them to greater effort, and their general conduct and attainments were better than usual. Shortly after her graduation, she visited Europe, in order to prosecute further her medical studies. In Paris she was told that it would be impossible for her to gain entrance to the schools or hospitals there, unless she adopted male attire; a suggestion repugnant to her taste, and to the great object she had in view—that is, the recognition of female physicians. After much perseverance, she was at length admitted into the Maternité, and was permitted to visit other hospitals. After studying at Saint Bartholomew's Hospital, and the Woman's Hospital, London, she returned to New York in 1851, and there established herself in practice. At first difficulties were thrown in her way by the refusal of physicians to meet her in consultation; but these were overcome, and she was soon established in excellent practice. In 1852 she delivered a series of lectures to women, on health and physical development, and published a work entitled *The Laws of Life, Considered with Reference to the Physical Education of Girls;* and in 1853 established the New York Infirmary for Women and Children, which proved so successful that she was induced, in coöperation with her sister Emily, to found, in 1868, The Woman's Medical College of the New York Infirmary. In 1868 she settled in London, and became connected with the Women's Medical College there. Her published works include: *Counsels of Parents on the Moral Education of their Children in Relation to Sex* (1879); *Corruptions of Neo-Malthusianism: the Influence of Women in the Medical Profession* (1890); and *Pioneer Work in Opening the Medical Profession to Women* (1895).

BLACKWELL, THOMAS (1701-57). A scholar of some eminence, born in Aberdeen, August 4, 1701; studied Greek and philosophy in Marischal College, and took the degree of M.A. in 1718. In December, 1723, he was appointed professor of Greek in Marischal College, and in 1737 published anonymously at London an *Inquiry into the Life and Writings of Homer* (2d ed. 1746), and shortly afterwards, *Proofs of the Inquiry into Homer's Life and Writings.* In 1748 he published, also anonymously, *Letters Concerning Mythology.* The same year he was made principal of Marischal College; and at the commencement of the session 1752, on his recommendation, a new order in teaching the sciences was introduced into the college. In 1753 he published the first volume of his *Memoirs of the Court of Augustus.* The second volume appeared in 1755, and the third, left unfinished by him, was completed by John Mills in 1764. He died March 8, 1757.

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BLACKWELL'S ISLAND. A narrow, rocky island in the East River, forming part of New York City, between Manhattan Island and Long Island, about 1½ miles long by one-eighth of a mile wide (Map: New York City, G 8). It is used exclusively for the penal institutions and hospitals under charge of the city of New York. See NEW YORK CITY.

BLACKWOOD. See ACACIA; KINGWOOD.

BLACK'WOOD, FREDERICK TEMPLE HAMILTON-TEMPLE (1826-1902). See DUFFERIN AND AVA, MARQUIS OF.

BLACKWOOD, WILLIAM (1776-1834). A distinguished Edinburgh publisher, the originator of *Blackwood's Magazine.* He was born in Edinburgh, November 20, 1776. After serving his apprenticeship to the bookselling business in his native city, and prosecuting his calling in Glasgow and London, he settled in Edinburgh as a bookseller—principally of old books—in 1804. On April 1, 1817, at which time he had become a publisher on his own account, he issued the first number of *Blackwood's Magazine.* The literary ability displayed in this periodical was so much in advance of the monthly magazines then existing that, after a little disappointment at first, it soon became a great success. Its remarkable popularity was sustained by the papers of John Wilson, J. G. Lockhart, James Hogg, and other writers, whom Blackwood had the liberality and tact to attract to his standard. Overwhelming its political and literary opponents, now with the most farcical humor, and now with the bitterest sarcasm—sometimes with reckless injustice—the magazine secured for itself a prodigious reputation, more particularly among the Tories, of whose political creed it has always been a resolute adherent. William Blackwood himself, who added literary tastes and acquirements to his profession of bookseller, was the chief manager of his magazine, and conducted the whole of the correspondence connected with it until his death, which took place September 16, 1834. The publishing business has been greatly extended by the descendants of the founder. Consult Oliphant, *William Blackwood and His Sons* (Edinburgh, 1897-98).

BLACKWOOD RIVER. A river in West Australia, which enters Flinders Bay, just east of Cape Leeuwin, in latitude 34° 14′ S. and longitude 115° 12′ E. (Map: Australia, B 5). It flows through the counties of Durham and Nelson, first to the west, and then to the south, traversing a district of wood and pasture. It is navigable for boats to a distance of 25 miles from the sea.

BLACKWOOD'S MAGAZINE. A famous magazine founded by the Edinburgh publisher, William Blackwood, in 1817, subsequently conducted by his son, John Blackwood, and still one of the important English periodicals in literature, philosophy, and politics.

BLADDER, URINARY (probably akin to the verb *to blow*). A bag which receives the urine in man and animals after it is secreted by the kidneys. The bladder-wall consists of three coats—a lining mucous membrane, a middle muscular coat, and an outer coat which is serous, where the organ is covered over by peritoneum and fibrous throughout the rest of its extent. The mucous membrane of the bladder is lined with stratified squamous epithelium (see EPITHELIUM), and contains small racemose glands (see GLAND) and lymph-nodules. The muscle of the middle coat is of the involuntary type, and consists of inner and outer layers which are longitudinal, and a middle circular layer. The serous coat consists of a connective-tissue layer covered by a layer of flat endothelial cells. Where the serous coat is wanting, a fibrous layer covers the muscular coat and blends with the surrounding connective tissue.

The average capacity of the bladder is one pint. The shape of the bladder is somewhat conical, the apex being upward, and the anterior part of the base constricted at the commencement of the urethra, forming the neck of the bladder. On each side, rather below its middle, open the two ducts from the kidneys (the ureters); an imaginary line drawn between them, and from each end of this line others drawn to the neck of the bladder, form an equilateral triangle. In this space, which is called the *trigonum,* the mucous membrane is not thrown into folds, but is smooth and very sensitive; the slightest pressure upon it gives rise to a desire for micturition. Children's habits of emptying their bladders when sleeping on their backs are supposed to be due to the urine accumulating in this part, as is also the distressing pain of stone. The bladder is situated in the pelvis, in adults, behind the pubes, in front of the rectum in the male and the uterus in the female, but much higher in the young. It is kept in position by four true or membranous ligaments, and false ligaments formed of folds of the peritoneum. In the male in front of the neck of the bladder lies the prostate gland, surrounding the first part of the urethra (q.v.). Like all cavities lined by mucous membrane, the bladder is subject to catarrhal inflammation, accompanied by an increased secretion of mucus, with fermentation, rendering the urine turbid, causing a frequent and painful desire to micturate, and constitutional disturbances. The symptoms may be relieved by hot applications, along with opiates, antacids, and diuretics. If there is much mucus or blood or decomposed urine in the bladder, it may be washed out with a solution of boric acid, or of creolin, or a weak mineral acid, in some cases. If there is any known cause for this inflammation, as a stone, it must be removed.

Some persons are frequently troubled with a desire to pass water; and many in this condition never effectually empty their irritable bladders, always leaving a portion which keeps up the irritation. This condition frequently arises from the habit of retaining the urine so long as to over-distend and weaken the muscular walls of the bladder; but it may be induced by general debility, the irritation of worms, cold, or an irritating state of the urine itself, or by nervousness, as in candidates for examination, etc. The best treatment is tonics, and soothing the irritability with sedatives. When this irritability is nocturnal, it may be from the patient lying on the back, as explained above; it generally occurs in delicate children, and is more a habit than a disease.

Paralysis of the bladder may be the result of accident, or disease of the nervous centres, or over-distention. In this condition the urine accumulates and dribbles away, and must be drawn off by the catheter (q.v.). This dribbling, or *in-*

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continence, must be distinguished from irritable bladder, as it is in nearly every case the sign of a distended bladder. *Retention* of the urine may be caused by mechanical obstacles to its exit, by paralysis, or by an absence of volitional power over the muscles. This last is termed *hysterical retention*, and is common in young girls, in persons suffering from seasickness, from nostalgia, from operation or from accident, such as a broken leg, etc. The power generally soon returns. Any long-continued difficulty in passing water is generally followed by a thickening of the walls of the bladder itself, or *hypertrophy*. The mucous membrane may form pouches in these thickened walls—a condition which is called sacculated bladder; cancerous diseases and tubercle may also attack this organ.

The bladder is liable to be ruptured by accident from without; as, for instance, by a blow. As this accident is usually fatal, prompt surgical aid must be secured.

BLADDER CAMPION. See SILENE.

BLADDERNUT (for derivation see below), *Staphylea*. A genus of plants, the type of a small natural order, Staphyleaceæ. (See SPINDLE-TREE.) Only about seven species are known, which are found in very different climates, and scattered over the world. They are mostly small trees of rather elegant appearance. The seeds contain a considerable quantity of a fixed oil, which is slightly purgative. The common bladdernut (*Staphylea pinnata*) is a native of the east of Europe, and of temperate parts of Asia, which has been admitted into the British flora, but has in all probability been introduced as an ornamental tree. It is frequently planted in shrubberies, as is also *Staphylea trifolia*, a North American species with ternate leaves. The wood of both is firm and white, well suited for the purposes of the turner. The seeds may be eaten, but act as a mild aperient. The flower-buds are pickled as capers. The name bladdernut has reference to the curious inflated membranous capsule, and the hard, bony 'testa' of the seed. The name Staphylea is from the Gk. *σταφύλη*, *staphylē*, a bunch of grapes, and has reference to the racemed flowers.

BLADDERWORM. An encysted larval tapeworm. See HYDATID and TAPEWORM.

BLADDERWORT (so named from the vesicles by means of which the flowers float above the water), *Utricularia*. A genus of plants of the natural order Lentibulariaceæ, containing a large number of species, the bright blossoms of which, along with those of water-lilies, etc., adorn the surface of lakes, ditches, and marshes in almost all parts of the world. They are particularly abundant within the tropics, and many are natives of Australia. In the United States are found a dozen or more species with yellow, violet, or purple flowers. Great Britain has only three species, all of which have yellow flowers. These plants are very interesting from the provision made for the expansion of their flowers above water, although the whole plant is ordinarily submerged. The stems and leaves are furnished with numerous little bladders or vesicles, which are filled with water till it is necessary that the plant should rise for the expansion of the flowers, when they become filled with air; and this, again, gives place to water after flowering is over, so that the seeds are ripened at the bottom. The bladders, at least of *Utricularia vulgaris*, have an orifice closed by a very thin elastic valve opening inward. Aquatic insects sometimes enter them, are imprisoned, and the plant utilizes the products arising from their decay. See Plate of BIGNONIA, etc.

BLA'DENSBURG. A town in Prince George County, Md., 6 miles northeast of Washington (Map: Maryland, K 5). Here, on August 24, 1814, a British force of 5000 men, under General Ross and Admiral Cockburn, with a loss of about 500, defeated 7000 untrained Americans under General Winder, who, at the first attack, with a loss of only 76, fled in wild disorder, leaving Washington open to capture. It was formerly a noted dueling-ground; and here, in 1820, Commodore Decatur was mortally wounded by Commodore Barron. Population, in 1890, 503; in 1900, 463. Consult articles on the battle and on the Bladensburg dueling-grounds in the *Magazine of American History*, Vols. XV. and XXV. (New York, 1877-93).

BLAENAVON, blā-nā'von (Cymr., Celt. *blaene*, source + *avon*, river). A coal-mining town and railway junction in Monmouthshire, England, on the Avon, 4½ miles southwest of Abergavenny (Map: England, C 5). Population, in 1891, 11,400; in 1900, 10,900.

BLAEU, blou, **BLÁEUW**, or **BLAUW.** A family of learned Dutch publishers. The founder of the firm was Willem Janszoon Blaeu (1571-1638), a mathematician, born at Alkmaar, Holland. He was a pupil in astronomy of Tycho Brahe, and secured a considerable reputation by publishing terrestrial and celestial globes, excelling in beauty and accuracy everything that had preceded them. The *Novus Atlas* (6 vols., 1634-62) is his principal work. His sons Cornelius (died 1650) and Joan (died 1673) carried on his business together until the death of Cornelius. Their *Atlas Major* (11 vols., 1662) is a splendid work, and the maps are valuable from the light they throw on local history. Two of Joan's sons carried on their father's business until about 1700. Some of their classical publications, especially *Cicero's Orations* (1699), are still highly prized. Consult Baudet, *Leven en werken van Willem J. Blaeu* (Utrecht, 1871).

BLAGOVIESHTCHENSK, blä'gô-vyĕsh'-chĕnsk (Russ., 'City of the Annunciation'; so named from the Church of the Annunciation). The capital of the Siberian region and Governor-Generalship of the Amur, situated on the left bank of the Amur, at its junction with the Seya, on the Manchurian frontier, and about 5000 miles east of Moscow (Map: Asia, M 3). It is one of the most prosperous and busy towns in East Siberia, and owes its prosperity chiefly to the gold-mines in the vicinity. Only a military outpost in 1856, it became in 1858 the capital of the Amur region, and is at present of considerable commercial as well as strategical importance. It was attacked by the Chinese in July, 1900. In 1868 it had but 3344 inhabitants; in 1889, 20,212, and at the census of 1897, 32,600 inhabitants.

BLAIKIE, blā'kĭ, WILLIAM GARDEN (1820-99). A Scottish divine and author. He was born at Aberdeen, a son of James Blaikie, an advocate, and provost of Aberdeen from 1833 to 1836. Educated at the universities of Aberdeen and Edinburgh, he was ordained minister of the

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Presbyterian congregation of Drumblade in 1842, but the next year he seceded and joined the Free Church of Scotland. From 1844 to 1868 he was minister at Pilrig in Leith Walk, Edinburgh, where he took a leading part in founding and managing model dwellings for the poor. From 1868 to 1897 he was professor of pastoral theology in New College, Edinburgh. In 1892 he was chosen moderator of the General Assembly of the Free Church. He was also one of the promoters and for several years the president of the Pan-Presbyterian Alliance, which holds councils in Great Britain and America. From the University of Edinburgh he received the degree of D.D. (1864), and from the University of Aberdeen that of LL.D. (1872). He died at North Berwick. Blaikie edited *The Free Church Magazine* (1849-53); *The North British Review* (1860-63); *The Sunday Magazine* (1873-74); and *The Catholic Presbyterian* (1879-83). His *Six Lectures to the Working Classes* (1849) and *Better Days for the Working People* (1863), were widely popular. His best work is *The Personal Life of David Livingstone* (1880). Among his numerous other books are: *Bible History* (1859); *Outlines of Bible Geography* (1861); *Heads and Hands in the World of Labor* (1865); *The Work of the Ministry* (1873); *Leaders in Modern Philanthropy* (1884); *Heroes of Israel* (1894); *Thomas Chalmers* (1896); and *Memoir of David Brown* (1898).

BLAINE, James Gillespie (1830-93). An eminent American statesman and political leader. His great-grandfather was Ephraim Blaine (1741-1804), an officer on the Patriot side in the American Revolution, who served from 1778 to 1782 as Commissary-General of the Northern Department. James was born, of Scotch-Irish parentage, at Brownsville, Pa., on January 31, 1830, and was educated in the common schools and at Washington College, Pa., where he graduated in 1847. After spending several years as a teacher, first in the Western Military Institute, at Blue Lick Springs, Ky., and subsequently in the Pennsylvania Institution for the Blind in Philadelphia, he became in 1854 one of the editors of the Kennebec (Maine) *Journal;* and three years later, although retaining his home at Augusta, undertook the editorship of the Portland *Advertiser*, an influential daily. In 1858 he was elected to the Legislature by the Republicans, and remained in that body four years, during two of which he served as Speaker. In 1859 he became Chairman of the Republican State Committee—a position of leadership in local politics which he retained until 1881. His rapid rise to influence and prominence in the State made natural his election, in 1862, to Congress, where he served for seven successive terms, during three of which he was Speaker of the House of Representatives. He was a pronounced Republican and a vigorous supporter of the Administration during the war. He nevertheless opposed the issue of greenbacks, and successfully urged an important modification to the Stevens plan of reconstruction. (See Reconstruction.) As Speaker he attained unusual success, and his conduct was uniformly marked by great readiness and ability. His course in this position, however, provoked acute controversies, the effect of which was seen when the Democrats secured control of the House in 1875, and when Blaine's impassioned opposition to the inclusion of Jefferson Davis (q.v.) in a general amnesty, on the ground of the latter's alleged complicity in the "gigantic murders and crimes of Andersonville," was followed by a vigorous effort of the Democrats to connect him with the Pacific Railroad frauds. This culminated in the highly dramatic incident of June 5, 1876, when the accused produced in the House of Representatives the 'Mulligan Letters' (q.v.), and offered what was considered an ample vindication of his course. The incident continued for a decade to be a cause of disturbance within the Republican Party, but its immediate effect was the enhancement of Blaine's prestige, and his strong and almost successful candidacy for the Presidential nomination. Upon the seventh ballot he received 351 votes, when a combination of all his opponents upon Hayes effected his defeat. The Electoral Commission (q.v.), which was created by the two Houses to decide the contested election, was vigorously opposed by Blaine on the ground that the powers conferred upon it exceeded those of Congress itself. Having been elected to the Senate in 1876, he worked against the Bland Silver Bill, opposed the unrestricted immigration of the Chinese, and favored strongly the policy of subsidizing various industries. He continued to occupy such a position of leadership that in 1880 he was again a candidate for the Republican nomination, and became in the convention the most formidable opponent of Grant, who had already served two terms as President. The defeat of the third-term candidate appearing to a majority of the delegates to be the most important matter, and the nomination of Blaine seeming impossible without causing serious discord, the adherents of Blaine and John Sherman united on the thirty-sixth ballot in throwing the nomination to Garfield, who defeated General Hancock in the ensuing election. Upon Garfield's inauguration, Blaine became Secretary of State; but the death of the President being followed by a reorganization of the Cabinet, he resigned the position in December of the same year. After his sudden retirement from the public service he devoted his time largely to the preparation of his *Twenty Years of Congress*, the first volume of which appeared in 1884, attracted widespread attention, and for the most part met with a favorable reception.

Again, in 1884, he was a candidate for the Presidential nomination, and this time was successful, although the bitterness of opposition within the party was such that in some States, notably in New York, Connecticut, and Massachusetts, large numbers of independent Republicans voted in the ensuing election for the Democratic nominee, Grover Cleveland, whose record as Governor of New York made it possible for him, by a small plurality, to carry that pivotal State and so secure the election, after a campaign remarkable for personal abuse and bitterness. It has been claimed that the State of New York, and consequently the national election, was lost to Blaine chiefly as the result of a persistent misrepresentation of his attitude toward Roman Catholics, consequent upon an unfortunate phrase, 'Rum, Romanism, and Rebellion,' used by a Republican clergyman, the Rev. Samuel D. Burchard (q.v.), in speaking of the Democratic Party; but the effect of the phrase has doubtless been considerably exaggerated. The leisure enforced upon Blaine by his defeat made

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possible the preparation of the second volume of his *Twenty Years of Congress* (1886), and of a volume of *Political Discussions* (1887).

His name was again before the Republican convention of 1888, but was early withdrawn, and upon Harrison's accession to the Presidency, Blaine was again placed in charge of the State department and was enabled to develop a line of policy proposed in 1881, but at that time reversed by his successor. Not only did he adopt a vigorous course with reference to the seal-fisheries, but his especial energy was devoted to plans for establishing close commercial relations with the South American States and for securing arrangements of reciprocity in trade with other foreign nations. He resigned in June, 1892, on the approach of the nominating convention, before which it was expected that both Blaine and Harrison might be candidates. Blaine's name was presented, but with no success. After a protracted illness, he died, January 27, 1893. Consult Gail Hamilton, *Biography of James G. Blaine* (Norwich, 1895).

BLAINVILLE, blăn'vêl', Henri Marie Ducrotay de. See Ducrotay de Blainville.

BLAIR. A city and county-seat of Washington County, Neb., 25 miles north by west of Omaha, on the Chicago and Northwestern, and the Chicago, Saint Paul, Minneapolis and Omaha railroads (Map: Nebraska, H 2). It contains a Danish college. The city is the market for the agricultural products and live stock of the vicinity. Population, in 1890, 2069; in 1900, 2970.

BLAIR, Andrew Alexander (1846—). An American chemist, born in Woodford County, Ky. He studied at the United States Naval Academy, and was made an ensign in the navy, but afterwards devoted himself to analytical chemistry, especially analysis of iron and its ores. From 1875 to 1878 he was employed in testing iron and steel for the United States Government at the Watertown Arsenal, and from 1879 to 1881 acted as chief chemist to the United States Geological Survey and the Tenth Census. At the termination of this engagement he devoted himself to the practice and improvement of the methods of technical analysis. Besides a number of original papers and reports on various special subjects of metallurgy, he wrote *The Chemical Analysis of Iron.*

BLAIR, Francis Preston (1791-1876). An American journalist and politician, born in Abingdon, Va. He graduated at Transylvania University, Ky., in 1811, and soon afterwards became prominent in State politics. He strongly supported Henry Clay for the Presidency in 1824, but in 1828 became an enthusiastic adherent of Andrew Jackson. In 1830 he went to Washington, on Jackson's invitation, to assume the editorship of the *Globe*, which was the official organ of the Democratic Party until 1845, when President Polk forced Blair's resignation. Blair supported Van Buren in 1848 and Pierce in 1852, but afterwards joined the newly organized Republican Party, and in 1856 presided over the Pittsburg Convention. In 1860 he was an active supporter of Abraham Lincoln. In December, 1864, he made an unofficial visit to Richmond, and proposed to Jefferson Davis and others who were influential in the Confederate Government the arrangement of a peace on the basis of a joint campaign by the Northern and Southern armies against Maximilian in Mexico. This proposal, though wholly unofficial, led to the famous peace conference of February 3, 1865, at Hampton Roads between President Lincoln and the Confederate representatives, Stephens, Hunter, and Campbell.

BLAIR, Francis Preston, Jr. (1821-75). An American lawyer, politician, and soldier, born in Lexington, Ky. He graduated at Princeton in 1841, was admitted to the bar in 1843, and removed to Saint Louis to practice law. In the Mexican War he served in the United States Army as a private. Afterwards he was editor for a time of the *Missouri Democrat*, became prominent in State politics, was a member of the Missouri Legislature from 1852 to 1856, and after 1856 served for several years in Congress as a Republican. At the outbreak of the Civil War he was the leader of the Union Party in Missouri, and by his energy, tact, and political sagacity was largely instrumental in preventing that State from joining the Confederacy. In April, 1861, he entered the Federal Army as a colonel, and before the close of the following year had risen successively to the rank of brigadier-general (August, 1862) and of major-general (November 29, 1862). He led a division under Sherman at Vicksburg in 1862-63, commanding the assault upon Chickasaw Bluffs (December 29, 1862); and in 1864 took a prominent part, as division commander and temporarily as commander of the Seventeenth Corps, in the famous march to the sea. He was nominated as Collector at Saint Louis and as Minister to Austria by President Johnson in 1866, but, owing to his views on reconstruction, the Senate refused to confirm either appointment. Afterwards he joined the Democratic Party, was its candidate for Vice-President in 1868, and from 1870 to 1873 was a member of the United States Senate. He published *The Life and Public Services of Gen. William O. Butler* (1848).

BLAIR, Henry William (1834—). An American politician and lawyer, born in Campton, N. H. He received an academic education, was admitted to the bar in 1859, and was prosecuting attorney for Grafton County in 1860. During the war he was lieutenant-colonel of the Fifteenth New Hampshire Volunteers. He was a member of the New Hampshire House of Representatives in 1866; of the State Senate, from 1867 to 1868; and Republican Representative in the Forty-fourth and Forty-fifth Congresses. From 1879 to 1891 he was United States Senator. He was appointed Minister to China in 1891, but that Government declined to receive him because of a bill which he had introduced for the purpose of restricting Chinese immigration. A bill to prohibit the sale and manufacture of liquors placed him in the van of the temperance ranks. The Blair Common-School Bill, appropriating $77,000,000 to the States in proportion to their illiteracy, was another of his measures.

BLAIR, Hugh (1718-1800). A Scottish divine and man of letters. He was born in Edinburgh, April 7, 1718. He was educated at the university of his native city, where he attracted the attention of his instructors by an *Essay on the Beautiful.* In October, 1741, he was licensed to preach by the presbytery of Edinburgh; and after occupying the churches of

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Colessie in Fifeshire, Canongate Church in Edinburgh, and Lady Yester's, he was promoted in 1758 to the highest position attainable by a Scotch clergyman—one of the charges of the High Church, Edinburgh. His discourses, which display little power or originality of thought, were yet greatly admired on account of their polished style. In 1759 Blair commenced a series of lectures on Composition at the university; and three years afterwards, a new chair of rhetoric and belles-lettres, with a salary of £70 a year, being created by the Crown, Blair was made professor. He held this appointment until 1783, when he resigned; and in the same year published his *Lectures*, which obtained a reputation far beyond their merits, and one that time has by no means sanctioned. His first volume of sermons, which appeared in 1777, proved a great success. George III. showed his appreciation of them by bestowing on Blair, in 1780, a pension of £200 a year. Opinion about their merits has much changed since the date of their publication; they are now considered as moral essays rather than sermons. Blair's critical acumen was not great; he strenuously defended the authenticity of Ossian's poems. He died December 27, 1800. For his life, consult Finlayson (London, 1801), and Hill (Edinburgh, 1807).

BLAIR, JAMES (1656-1743). A Colonial clergyman and educator, the founder and first president of William and Mary College in Virginia. He was born in Scotland, graduated at the University of Edinburgh in 1673, removed to England in 1682, and in 1685 was sent to Virginia as a missionary of the Church of England. He was minister successively at Henrico City, Jamestown, and Williamsburg, and after 1689 was Commissary of Virginia, "a very weighty and creditable post," the highest ecclesiastical position, at that time, in the colony. In this capacity he did much to raise the character of the provincial clergy and to rectify many clerical abuses. In 1690, at a time when there was only "one privately endowed school and a few old field schools" in the colony, he took up the work of founding a college in Virginia, and in the same year began soliciting subscriptions for an institution which was to provide for "the Education of our Youth, a constant supply of our Ministry, and perhaps a foundation for ye Conversion of our neighboring Heathen to the Christian Faith." In 1691 he went to England, and there, in 1693, secured a charter for the College of William and Mary. On his return he worked indefatigably to secure the immediate erection of buildings, and until his death was president of the college. After 1693 Blair was also a member of the Council of Virginia, of which he was for some time president. In this capacity he had rancorous disputes with Governors Edmund Andros, Francis Nicholson, and Alexander Spotswood, and by his representations to the home Government was instrumental in securing the removal of each in turn. It has been said of Blair that he did more than any other one man for the intellectual advancement of Virginia during the Colonial period. He collaborated with Henry Hartwell and Edward Chilton in the preparation of a valuable work, entitled *The Present State of Virginia and the College* (London, 1727), probably the best extant account of Virginia in the latter part of the Seventeenth Century, and published an elaborate series of sermons on *Our Saviour's Divine Sermons on the Mount* (1740), which have been much commended by theologians. Consult D. E. Motley, "Life of Commissary James Blair, Founder of William and Mary College," in Series 9, No. 10, of *Johns Hopkins University Studies* (Baltimore, 1901).

BLAIR, JOHN INSLEY (1802-99). An American capitalist and philanthropist. He was born in Warren County, N. J., and from 1811 to 1819 worked in a small store in Hope, N. J. Later he removed to Blairstown, became interested in the Oxford Iron Furnace in Warren County, and in 1846 was associated with the Scranton Brothers in the first attempt to manufacture iron with anthracite coal. To facilitate the transportation of the company's output, he and his associates constructed the road which subsequently became known as the Delaware, Lackawanna and Western. In later life he was connected, either as builder or director, with twenty railroads, and at one time was said to own more miles of railroad than any other man in the world. He gave Blair Hall and about $70,000 to Princeton College, where he established a professorship; helped to rebuild Grinnell College, Iowa; gave nearly $90,000 to Lafayette College, and about $600,000 to the Presbyterian Academy at Blairstown, and contributed toward building over one hundred churches in the towns laid out along the lines of his railroads.

BLAIR, MONTGOMERY (1813-83). An American lawyer and politician, the son of Francis P. Blair, Sr. He was born in Franklin County, Ky., graduated at West Point in 1835, and served for several months in the first Seminole War. He then resigned from the service, studied law, was admitted to the bar in 1839, and began to practice in Saint Louis. He was for a time United States district attorney for Missouri, was mayor of Saint Louis in 1842-43, and from 1843 to 1849 was judge of the Court of Common Pleas. In 1852 he removed to Maryland, where he devoted his attention as a lawyer chiefly to important cases before the United States Supreme Court, and quickly became prominent as a Democrat in State politics. From 1855 to 1858 he was United States solicitor in the Court of Claims, and in 1857 was the counsel for the defendant in the celebrated Dred Scott Case (q.v.) and made an able argument in support of his side. Strongly disapproving of the attitude of the Democratic Party toward the repeal of the Missouri Compromise in 1854, he joined the newly organized Republican Party in 1856, and in 1860 was Chairman of the State Republican Convention. In 1861 he became a member of Lincoln's Cabinet as Postmaster-General, and in this capacity served with great ability until September, 1864, when he resigned. His term is notable in the history of the department from the fact that during it money-orders first came into use, and such improvements as free delivery in cities and the sorting of the mails on postal cars were introduced. After the war, Blair returned to the Democratic Party, and in 1876-77 was conspicuous as a supporter of Tilden in the famous Tilden-Hayes controversy.

BLAIR, ROBERT (1699-1746). A Scottish clergyman and writer. He was born in Edinburgh, was educated at the university there and in Holland, was licensed to preach in 1729, and from

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1731 until his death was settled at Athelstaneford in East Lothian. Besides an elegiac poem and several paraphrases of Scripture which have been totally forgotten, he wrote the forcible but strikingly lugubrious poem of 767 lines, entitled *The Grave*, which, first published in 1743, enjoyed considerable popularity and was frequently reprinted.

BLAKE, Edward (1833—). A Canadian statesman. He was born in Ontario, Canada, graduated at the University of Toronto, was called to the bar in 1856, and soon rose to the first rank among chancery practitioners. In 1867 he was elected to both the Ontario and Dominion Parliaments, and in the former House became the leader of the Liberal Opposition. In 1871 he became Premier of Ontario, but soon resigned. He was Privy Councilor in 1874, and Minister of Justice in 1875. After the return of the Conservatives to power, he became the leader of the Liberal Party in 1880; was elected to the British Parliament from South Longford, Ireland, in 1892, and was appointed to the judiciary committee of the Privy Council in 1896.

BLAKE, Eli Whitney (1795-1886). An American inventor. He was born in New Haven, Conn., and studied law at Yale. He assisted his uncle, Eli Whitney (q.v.), in the management of the gun-factory at Whitneyville, until the death of the latter in 1825, when he succeeded to the business. In partnership with his brothers he established a factory at Westville in 1836 for the manufacture of articles of house-furnishing hardware. The most useful invention of Blake, however, is the stone-breaking machine named after him—a device now extensively used for crushing stones and other hard substances. Among the numerous papers contributed by him to scientific publications are the following: *The Flow of Waste Fluids Through an Orifice; The Form, Formation, and Movement of Sonorous Waves; Original Solution of Several Problems in Aërodynamics* (1882).

BLAKE, Francis (1850—). An American inventor, born at Needham, Mass. In 1866-79 he was connected with the United States Coast Survey, and in 1878 invented the transmitter for telephone instruments, which, known under his name, has become the most extensively used throughout the world.

BLAKE, James Hopwood (1843-1901). An English geologist and surveyor, born in London. He was educated there at King's College, and apprenticed to the civil engineer Brereton, under whose direction he was for several years engaged in railway engineering and construction in Cornwall and Southern Wales. In 1868 Blake joined the Geological Survey of Great Britain, and was commissioned to prepare large scale maps of certain portions of southern England. He surveyed parts of Somerset, Suffolk, and Norfolk, and studied the phenomena of the drift deposits of those regions. Several contributions, embracing the results of his observations on the drift and the Mesozoic formations, have been published in the *Memoirs of the Geological Survey of the United Kingdom* and in the *Geological Magazine*.

BLAKE, Lillie Devereaux (1835—). An American woman suffragist and reformer. She was born in Raleigh, N. C., and was educated in New Haven, Conn. She married, in 1855, Frank G. Q. Umsted, a Philadelphia lawyer, who died in 1859, leaving her with two children to support. She turned her attention to literary work, her first story, *A Lonely House*, appearing in the *Atlantic Monthly*. In the next few years she completed two successful novels, *Southwold* (1859) and *Rockford* (1862). In 1866 she married Grinfill Blake, a wealthy New York merchant. She was one of the active promoters of the movement that resulted in the founding of Barnard College, and was prominent as a speaker on educational topics. She also identified herself with the woman's suffrage movement, and has delivered many addresses on the subject throughout the country. She was president of the New York State Woman's Suffrage Association from 1879 to 1890, and of the New York City Woman's Suffrage League from 1886 to 1900. She was largely instrumental in securing the passage in 1880 by the New York Legislature of the law permitting woman's suffrage in school elections, and was the author of the law providing for matrons in the police stations, passed in 1891, and of that requiring storekeepers to provide seats for saleswomen. In addition to the books mentioned, her writings include: *Fettered for Life* (1874), a novel dealing with the woman's suffrage question; *Woman's Place To-day* (1883), lectures delivered in reply to a series of Lenten sermons on "Woman," by Rev. Morgan Dix; and *A Daring Experiment* (1894).

BLAKE, Robert (1599-1657). An English soldier and admiral of the Commonwealth. The eldest of twelve sons of a merchant, he was born at Bridgewater, Somerset, in August, 1599. He studied at Oxford from 1615-25, taking his degree of M.A. in 1623 at Wadsworth College. When the Civil War broke out, he raised a troop in Somersetshire, and narrowly escaped hanging for prolonging the defense of Bristol, when the Governor had capitulated. Parliament subsequently appointed him lieutenant-colonel, and by his obstinate defense of Lyme with five hundred men against Prince Maurice's five thousand, he seriously damaged the reputation of that warrior, who retired in disgust. In 1644 he surprised Taunton, of which place he was made governor, and gave proof of no mean military skill by defending the place against an overwhelming force, until the town was little better than a heap of ruins, when the siege was raised. In 1649, in conjunction with two other officers of equal rank, he was appointed general of the sea, the two services, military and naval, at that time not being distinct. This was Blake's true sphere. After an exciting hide-and-seek chase of several months, in 1651 he destroyed the squadron of Prince Rupert, which had sought safety in the Tagus, and forced the Royalists to surrender Guernsey, Jersey, and the Scilly Isles. In March, 1652, he was made sole admiral of the fleet for nine months, and during this year fought four engagements with Dutch fleets under Tromp, De Ruyter, and De Witt. In the first, on May 19, the Dutch retreated under cover of darkness, with the loss of one man-of-war captured, and another sunk. In the next engagement, a squadron of 12 ships, sent to protect the herring-vessels from the attacks of Blake, were captured; and in the third, on September 28, 3 Dutch vessels were destroyed, and the rear-admiral taken. On November 29 a fleet of 80 vessels, under the command of Tromp, encountered Blake with only

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40 off the Goodwin Sands. The result of the action was the loss of 6 English ships—2 captured and 4 destroyed; the rest, in a shattered condition, sought safety in the Thames. There is a story, now discredited, that Tromp tied a broom to the masthead of his vessel, and sailed through the Channel, intimating that he had swept English vessels clean out of it. If he did, his pride was short-lived, for by February, 1653, Blake was at sea again with 80 ships, and falling in with Tromp with about an equal force, was at once attacked, but after a three days' running fight, the Dutchman was forced to seek shelter in the shallow waters of Calais, with a loss of 11 men-of-war, and 30 of a fleet of merchantmen he had in convoy. The English lost only one ship, but Blake was severely wounded. On the 3d and 4th of June his coadjutors, Deane and Monk, won another victory over Tromp, and his wound alone prevented Blake from taking part in the engagement of July 31, which finally shattered the naval supremacy of Holland. In 1654 Blake was appointed by Cromwell to command an English fleet in the Mediterranean, where he soon made the British flag respected by Dutch, Spanish, and French. The Dey of Tunis refused to pay homage to it. Blake attacked his capital, burned the Turkish fleet of nine ships which lay before it, accomplished a landing, and with a body of 1000 men annihilated an army of 3000 Turks. He next sailed to Algiers and Tripoli, landed, and set free all the English who were detained as slaves. He concluded alliances favorable to England with Venice and Tuscany. In 1657 he defeated the Spaniards at Santa Cruz. This was, perhaps, one of the most daring actions in Blake's career. With a wind blowing right into the bay—which was very strongly defended—Blake dashed in, attacked and destroyed the Spanish galleons and shipping in the harbor, and, the wind fortunately changing, sailed out again with a loss of only one ship and 200 men. The Spanish loss in men and property was immense, and the terror the action inspired insured increased respect to the English flag. His health now failed; he returned to England, and died, as his ship entered the harbor of Plymouth, August 7, 1657. Cromwell honored his memory by a solemn funeral procession, and caused him to be interred in Westminster Abbey, whence his body, with those of other Revolutionary celebrities, was removed by royal command at the Restoration. Consult: Gardiner, *History of the Commonwealth and Protectorate* (New York, 1894-1901), decidedly the best account of the naval war, with full citation of the original authorities; Samuel Johnson, *Life of Blake* (London, 1792); and Dixon, *Robert Blake* (London, 1852). The principal original materials may be found in *Calendars of State Papers, Domestic* (London, 1649-57); and Thurloe, *State Papers* (London, 1742).

BLAKE, William (1757-1827). An English engraver and poet. He was born in London November 28, 1757. In 1789 he published *Songs of Innocence*, followed in 1794 by *Songs of Experience*, Showing the Two Contrary States of the Human Soul, with about 60 etchings, remarkable for their peculiar and original manner. The poems were equally singular, but many of them exhibited true pathos. Some marginal designs for Young's *Night Thoughts*, executed by Blake, were greatly admired by Flaxman. Blake lived in the full belief that he held converse with the spirits of the departed great—with Moses, Homer, Vergil, Dante, and Milton. He published numerous etchings, chiefly of religious and cognate subjects, among the best of which are his *Inventions to the Book of Job*, and the illustrations of Blair's *Grave*. He died (August 12, 1827) in poverty and obscurity, with the conviction that he was a martyr to poetic art. The influence of Michelangelo is traceable in his art; but the imagination which produced his bold and often curious designs was peculiarly Blake's own, while in his diction, though at times almost irrational, he was, according to Swinburne, "the single Englishman of supreme and simple poetic genius of his time," and Charles Lamb regarded him as one of the most extraordinary persons of the age. The facts of Blake's early life are recorded in a book, now rare, written by Dr. Malkin, *A Father's Memoirs of his Child* (1806). Consult: Gilchrist, *Life and Works of William Blake* (2d ed. London, 1880); Swinburne, *William Blake: A Critical Essay* (London, 1868); *Poetical Works of William Blake*, ed. W. M. Rossetti (London, 1874); and *Works*, edited with lithographs of the illustrated "Prophetic Books," and memoir and interpretation, Ellis and Yeats (London, 1893).

BLAKE, William Phipps (1826—). An American scientist. He was born in New York, graduated at the Sheffield Scientific School in 1852, was mineralogist and geologist of the Pacific Railroad Exploring Expedition of 1853, and author of several of the reports. He edited the *Mining Magazine* (1859-60), and was mining engineer for the Japanese Government from 1861 to 1863, when he was appointed professor of mineralogy in the College of California, and geologist to the State board of agriculture. He was commissioner for California at the Paris Exposition of 1867; was executive commissioner for Connecticut in the Centennial Exposition, and was special agent to Vienna in 1873. He also coöperated in the Paris Expositions of 1878 and 1889, and in the Chicago Exposition of 1893. He has published *Silver Ores and Silver Mines* (1860); *Report on the Production of Precious Metals* (1867); and *Ceramic Art and Glass* (1878).

BLAKELOCK, Ralph Albert (1847—). An American landscape painter. He was born in New York, and is self-taught. The following are a few of his principal works: "Indian Girl, Uinta Tribe"; "Story of Buffalo Hunt" (1880); "Shooting the Arrow" (1880); "Indian Fisherman" (1882); "Bannock Wigwam in Peaceful Vale" (1883).

BLAKELY, blāk'lĭ, Johnston (1781-1814). An American naval officer, born near Seaford, Ireland. He emigrated with his parents to the United States, graduated at the University of North Carolina in 1800, and in the same year entered the United States Navy. In 1813 he became commander of the *Wasp*, a new sloop of war, and in his first cruise captured the English sloop *Reindeer*. On another cruise he captured several prizes, and defeated the *Avon* and the *Atalanta*. Late in 1814 the *Wasp* left on a cruise, but never returned to port, and was presumably wrecked.

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BLAMIRE, blā-mīr′, SUSANNA (1747-94). An English poet, known as 'the Muse of Cumberland.' She was the daughter of a peasant, and passed her life in her native shire. She wrote several descriptive poems, as "Stoklewath" and "Epistle to Friends"; and many beautiful songs in the Scotch dialect, as "The Traveler's Return" and "The Waefu' Heart." Consult *Poetical Works*, with memoir by P. Maxwell (Edinburgh, 1842).

BLANC, LE, le blăn (Fr., the white; see below). A town in the Department of Indre, France, beautifully situated on the Creuse, which divides the town into two parts, about 32 miles west-southwest of Châteauroux (Map: France, H 5). It is known principally for the beautiful Lake Blanc (3450 feet above sea-level), near which it is situated, so called from the reflection of the quartz lining its bottom. Le Blanc has cloth and linen-yarn mills, potteries, tanneries, vinegar-works, forges, etc., and utilizes the surplus waters of the lake to furnish power for its machinery. It is very ancient, and was frequented by the Romans. Population, in 1896, 6764.

BLANC, MONT. See MONT BLANC.

BLANC, AUGUSTE ALEXANDRE PHILIPPE CHARLES (1813-82). A French art-critic, born at Castres. He was head of the Department of Fine Arts in the Ministry of the Interior from 1848 to 1852, and again from 1871 to 1873. He became a member of the French Academy in 1876 and professor of æsthetics at the Collège de France in 1878. He is chiefly known as the editor of and contributor to the *Histoire des peintres de toutes les écoles*, 14 vols. (1849-75), for which he wrote biographies of the artists of the Dutch and French schools. This work was also published in English. He also wrote *L'Œuvre complet de Rembrandt* (1873); *Grammaire des arts du dessin* (1876), his most important work, and *Grammaire des arts décoratifs* (1881), its sequel; besides other works, and was editor of the *Gazette des Beaux-Arts*.

BLANC, JEAN JOSEPH LOUIS (1811-82). A French socialist and historian, born in Madrid, October 29, 1811. In 1820 he was placed in the college at Rhodez; in 1830 he went to Paris and became a clerk in an attorney's office for a short time, and in 1832 became private tutor at Arras. Here he resided for two years, contributing largely, on literary and political subjects, to the *Progrès du Pas-de-Calais*. He afterwards went to Paris, where he contributed to various political papers, and where in 1839 he founded the *Revue du Progrès*, in which he first laid down some of his socialistic theories. In this journal, too, he brought out his famous treatise on socialism, the *Organisation du travail*, which in 1840 appeared in a reprint. The book obtained for its author general recognition as one of the ablest of Socialist writers, as well as wide popularity among the French *ouvriers*, who were captivated by the brilliancy of the writing, the apparent simplicity of the scheme, and the freshness of the views advocated. The book denounces the doctrine of individualism—i.e. individual and competitive efforts in labor—and advocates the absorption of the individual in a vast 'solidarity,' where "each would receive according to his needs, and contribute according to his abilities." Blanc next published (in 1841-44) a historical work, entitled *Histoire de dix ans, 1830-40*, aimed with deadly effect against the Orleans dynasty. Louis Philippe afterwards declared that "it acted like a battering-ram against the bulwarks of loyalty in France." It owed its success partly to the exposure it gave of the scandalous jobbery and immorality of the Crown and its advisers, partly to that passionate ardor which changed the tranquillity of history into the vehemence of a pamphlet, and its academic pomp of style. This was followed by the first volume of a *Histoire de la révolution française*, in which the author's aim was to describe, from his own point of view, not only the incidents of the first Revolution, but the social history of the Eighteenth Century. In the February revolution of 1848 Blanc played an important part. His popularity with the working classes led to his being appointed a member of the Provisional Government. He was placed by the Government at the head of the great commission for discussing the problem of labor. At the same time, Marie, Minister of Public Works, began—but without Blanc's coöperation—to establish the so-called national workshops (*ateliers nationaux*), which were to bring about the realization of the socialistic principle, but which only proved the hazardous and impracticable character of Blanc's doctrines. The national workshops led to an attempt on the part of the Socialists to dissolve the National Assembly by force and to institute a provisional government at the Hôtel de Ville, May 15, 1848. Blanc's name was, in the minds of many, connected with this movement. A proposal was made to prosecute him, but it was negatived by the National Assembly. After the June insurrection, he was again accused and prosecuted for conspiracy, but he contrived to escape to London, where he resided until the fall of the Empire. During his exile he devoted himself to political and historical literature. In 1849 appeared his *Appel aux honnêtes gens*, and *Catéchisme des socialistes;* in 1850, *Pages d'histoire de la révolution de février*, and in 1851, *Plus de Girondins; la république une et indivisible*. He acted also as correspondent for several Parisian journals, and a collection of his letters from London was published under the title *Dix années de l'histoire d'Angleterre* (10 vols., Paris, 1879-81). The work which has secured him the most enduring reputation is his *History of the French Revolution*, in 12 volumes, written during his residence in England. It is characterized by extensive and original research, which has frequently enabled the author to reverse the common verdicts on historical personages, and to explode many of the extravagant stories of the stormy period of which it treats. On the fall of the Empire in 1870, Blanc returned to France, and in 1871 he was elected to the National Assembly, in which he pursued a policy of consistent radicalism without returning to his former Socialistic theories. He died at Cannes, December 6, 1882. Consult Fiaux, "Louis Blanc," in *Portraits politiques contemporains*, Vol. II. (Paris, 1883).

BLANC, blăṇk, LUDWIG GOTTFRIED (1781-1866). A German philologist and Dante scholar. He was born in Berlin, and after studying at the French Theological Seminary of his native city, was called to a pastorate at Halle, in 1806. In 1811 he was suspected of having taken part in a conspiracy against King Jerome of Westphalia, and was imprisoned until 1813, when he

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was released by a Russian flying corps. He was professor of Romance languages at the University of Halle in 1822, and from 1838 to 1860 was one of the preachers at the cathedral of that city. Professor Blanc is known chiefly for his numerous and scholarly treatises on Dante. His most important works are his *Grammatik der italienischen Sprache* (1844), the first attempt to trace the history of the development of the forms and laws of that language; *Vocabolario Dantesco*, in French (1852); and his translation of the *Divine Comedy*, with commentary (1864). His *Handbuch des Wissenswürdigsten aus der Natur und Geschichte der Erde und ihrer Bewohner* (1867-69) also enjoyed a wide popularity.

BLANC, blän, Marie Thérèse. See Bentzon, Th.

BLANC, Paul Joseph (1846—). A French painter. He was born in Paris, and studied with Bin and Cabanel, obtaining in 1867 the second prize in the competition contest for the *prix de Rome*. Among his principal works are the following: "Murder of Laius by Œdipus" (1867); "Perseus" (Luxembourg, 1870); "The Invasion" (1873); "The Vow of Clovis in the Battle of Tolbiac" (1876); "Brigand's Wife" (1878); "The Triumph of Clovis" (1881); "The Tiber" (1885).

BLANCHARD, blän'shär', Auguste Thomas Marie (1819—). A French engraver, born in Paris. He was the pupil of his father, Auguste Jean B. M. Blanchard (1792-1849). He devoted himself to engraving modern pictures, and exhibited with success at the Universal Expositions of 1855, 1867, and 1878. He received many medals, and in 1861 the decoration of the Legion of Honor. In 1888 he was made a member of the Académie des Beaux-Arts. He is considered one of the first engravers of France.

BLANCHARD, blän'chard, Edward Litt Laman (1820-89). An English journalist and dramatist. He was born in London, and in 1831 accompanied his father, the well-known comedian, William Blanchard, to New York, where he appeared upon the stage. Returning to England, he was engaged during the rest of his life as a dramatic critic for various papers and a writer of numerous plays, farces, and pantomimes. Of the latter he composed over a hundred, which for beauty and fancy of conception have never been equaled, furnishing the Drury Lane pantomime for thirty-seven consecutive years. He was also a prolific writer of short stories, and was a staff writer at different times on the *Sunday Times*, the *Weekly Dispatch*, the *Observer*, the *London Figaro*, and the *Daily Telegraph*, his connection with the latter paper extending from 1863 until his death. He edited Thomas Dugdale's *England and Wales Delineated* (1860) and Willoughby's *Shakespeare;* and was the author of two novels, *Temple Bar* and *Man Without a Destiny*, and of several guide-books. Consult Scott and Howard (editors), *Life of E. L. L. Blanchard* (London, 1891).

BLANCHARD, blän'shär', Emile (1820-1900). A French naturalist, born in Paris. As assistant naturalist to the museum, he was several times appointed to represent Milne-Edwards in the entomology course. He was appointed a member of the Academy of Sciences in 1862, and president of that institution in 1881. The following are his principal works: *Histoire naturelle des insectes orthoptères, neuroptères, etc.* (1841); *Histoire des insectes, traitant de leurs mœurs et de leurs métamorphoses en général* (1845); *La zoölogie agricole* (1854, et seq.); *L'Organisation du règne animal* (1851-64).

BLANCHARD, François (1738-1809). A French aëronaut. In 1784 he attempted to build a balloon with wings or sails and a rudder, and in 1785 he crossed the English Channel by balloon. In the same year he used, for the first time, a parachute according to Montgolfier's ideas, and laid claim to the invention. He came to the United States in 1796, and gave many balloon exhibitions. In 1798, at Rouen, he took up sixteen persons in a single balloon and landed them safely fifteen miles away. He lost his life in 1809 during a balloon ascent. See Aëronautics.

BLANCHARD, blän'chard, Samuel Laman (1804-45). An English journalist and author, born at Great Yarmouth. He studied at Saint Olave's School, and became clerk to a proctor of Doctors' Commons. He subsequently wrote for a journal called *The Drama*, and was a traveling player and a proof-reader. In 1827 he was appointed secretary to the Zoölogical Society, and in 1828 published *Lyric Offerings*, a volume of verse dedicated to Charles Lamb. He was appointed acting editor of the *Monthly Magazine* in 1831, and in 1832 of the *True Sun*, a Liberal newspaper. He also edited the *Court Journal* in 1837, the *Courier* in 1837-39, *George Cruikshank's Omnibus* in 1842, and was a member of the *Examiner* staff from 1841 until his death. He numbered among his friends Douglas Jerrold, Dickens, Leigh Hunt, B. W. Procter, Browning, Cruikshank, and Bulwer-Lytton. Some of his essays were collected by Bulwer as *Sketches of Life* (1846), and his poems by Blanchard Jerrold (1876). Another collection of essays appeared in 1855 as *Corporation Characters*.

BLANCHARD, Thomas (1788-1864). An American mechanic and inventor. Among his inventions were: a machine for making tacks, one for turning gun-barrels, a lathe for turning gun-stocks and other irregular shapes; a steam-wagon, before locomotives were used; contrivances to aid steamboats in ascending rapids, and a machine for bending large timber. He received more than 25 patents for important inventions.

BLANCHE, blänsh, August Theodor (1811-68). A Swedish poet. He was born in Stockholm, and studied law at the University of Upsala. In literature he displayed remarkable productivity and versatility. The works by which he established his reputation were the comedies respectively entitled *Hittebarnet* (1847); *Rika Morbror* (1845); and *En tragedi i Wimmerby* (1848)—which are still considered among the ornaments of Swedish dramatic literature. His complete works, with a biographical sketch by Hedin, were published at Stockholm in 1891.

BLANCHEFLEUR, blänsh'flēr'. See Flore et Blanchefleur.

BLANCHE-LYON, blänch'lī'ŭn (from the figure of a white lion). The title of one of the English pursuivants-at-arms. See Pursuivant.

BLANCHE OF CASTILE, kăs-tēl' (1187-1252). The daughter of Alfonso IX. of Castile

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and Eleanor, daughter of Henry II. of England. She was married May 23, 1200, according to treaty, to Louis, heir apparent to the Crown of France. After the death of her husband in 1226, she was regent during the minority of her son, Louis IX. (q.v.), and as such she had to struggle against almost continuous revolts, and succeeded in suppressing a formidable conspiracy of the nobles. She acquired Toulouse by treaty, and compelled the submission of the Duke of Brittany. Possessed of remarkable executive talent, she supervised personally all the departments of government, not excepting the army. She married her son to Margaret of Provence in 1234, and when she resigned her office two years later, she left France in a most flourishing condition. From 1248 to 1252 Blanche again acted as regent while Louis was gone on a crusade. The common people of France rebelled against the heavy taxation necessitated by the large outlays of the King on his crusading expeditions; but she put them down with a strong hand; and in spite of all these embarrassments successfully resisted the encroachments of the Church. France has seldom had so able a ruler, or one whose death was more universally lamented. She died in November, 1252. Consult: Petit-Dutaillis, *Etude sur la vie et le règne de Louis VIII.* (Paris, 1894); Berger, *Histoire de Blanche de Castille* (Paris, 1895).

BLANCHE OF DEV'AN. A character in Scott's poem, "The Lady of the Lake."

BLANCHET, blän'shâ', JOSEPH GODERICK (1829—). A Canadian statesman. He was born at Saint Pierre, studied at the Quebec Seminary, and graduated at the College of Saint Anne as a physician. During the Saint Albans and Fenian raids of 1864 and 1866-70, he commanded a battalion of volunteer infantry. He was speaker of the Provincial Legislature for seven years, and mayor of the town of Lévis. On account of the law on dual representation, he resigned his seat in the Canadian Assembly, to which he had been elected in 1861, but retained his seat in the Quebec Assembly until his defeat in 1875. In politics he is a Liberal Conservative.

BLANCH FEE, or **BLANCH HOLDING** (Fr. *blanc*, white; referring to the payment in white metal, that is, silver). One of the ancient feudal tenures in the land law of Scotland, the duty payable to the superior, or lord, being in general a trifling sum expressed in silver instead of gold, or merely illusory, as a peppercorn, "if asked only," although it may happen that the duty is of greater value. Anciently, many estates in Scotland were held, both of the Crown and other superiors, by this tenure, but it now seldom appears in the grant of an original right of property. See FEUDAL SYSTEM; TENURE.

BLANCHING (Fr. *blanchir*, to make white, from *blanc*, white; cf. Eng. *blank*). A process by which gardeners arrest the formation of chlorophyll and certain secretions in plants by the exclusion of light, thus depriving the leaves of much of their color and bitterness and making them more palatable. Celery and sea-kale are familiar examples. Blanching is generally effected by heaping earth or litter about the parts to be blanched, tying heavy paper about the plant, covering with boxes or pots perforated at the top, etc. See CHLOROPHYLL.

BLANCO, blän'kô, CAPE. See CAPE BLANCO.

BLANCO, GUZMAN. See GUZMAN BLANCO.

BLANCO, JOSÉ FELIX (1782-1872). A Venezuelan patriot, born at Carácas. He was ordained as a priest in 1801, but nevertheless took an active part in the movement for Venezuelan independence, and became chaplain in the Revolutionary Army. In 1818 his favorable report upon the possibilities of the campaign induced Bolivar to invade New Granada. In 1830 Blanco was made brigadier, and after the separation of Venezuela from Colombia, became, successively, Governor of Maracaibo, Minister of War (1837), and Minister of Finance (1854). The fall of Monagas forced him to retire, and he returned to the Church. The best years of his life were spent in preparation of his work, in 16 volumes, *Documentos para la historia de la vida pública del Libertador de Colombia, Perú y Bolivia*, published posthumously in Carácas in 1877.

BLAND, EDITH NESBIT (1858—). An English poet. She was born in London, August 15, 1858, and educated in London and on the Continent. She married Hubert Bland in 1879. She has published a large body of beautiful verse and several delightful children's books and stories. Her poem on the Queen (1901) was by far the best occasioned by the death of Victoria. Among her publications are *Lays and Legends* (1st series, 1886; 2d series, 1892); *Leaves of Life* (1888); *A Pomander of Verse* (1895); *In Homespun* (1896); *Songs of Love and Empire* (1897); *Grim Tales* (1893); *The Story of the Treasure-Seekers* (1899); *Pussy and Doggy Tales* (1899); *The Book of Dragons* (1900).

BLAND, RICHARD PARKS (1835-99). An American legislator, born near Hartford, Ky. He emigrated to Missouri, thence to California, and from California to Utah Territory, where in 1860 he was admitted to the bar. Having returned to Missouri, he there continued the practice of law, and in 1872 was elected as a Democrat to the National House of Representatives, in which he served until 1895, and from 1897 until his death. As a Congressman he is best known for his connection with the free-silver movement. In the Forty-third Congress he stoutly opposed the bill for the demonetization of silver, afterwards styled by him 'the crime of '73.' He voted in 1874 for the bill, vetoed by President Grant, for the increase of greenback circulation, and in 1878 introduced a bill which, as amended by the Senate and passed over the veto of President Hayes, provided for the coinage of not less than $2,000,000 nor more than $4,000,000 worth of silver bullion a month, and continued in force until repealed by the passage of the Sherman Law in 1890. In 1893 he was chairman of the House committee on coinage, weights, and measures, and in 1896 was indorsed by the State of Missouri as Democratic candidate for the Presidency, and received 291 votes in the National Convention at Chicago. Consult W. V. Byars, *An American Commoner: The Life and Times of R. Parks Bland* (Columbia, Mo., 1900). See BIMETALLISM.

BLAND, THEODORIC (1742-90). An American patriot and author. He was born in Prince George County, Va., was educated in medicine in Edinburgh, and practiced in Virginia. On the approach of the Revolution he took an active part

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in the controversies with Lord Dunmore (q.v.), and attracted especial attention by a series of papers written under the pen-name 'Cassius.' He served through the Revolutionary War as a lieutenant-colonel of Virginia cavalry, and was an intimate friend and confidant of Washington. He was a member of Congress from 1789 to 1790. The *Bland Papers*, which contain valuable historical material covering the period of the Revolution, were collected and edited by Charles Campbell (Parkersburg, 1840).

BLAND'AMOUR', SIR (evidently *bland*, Lat. *blandus*, smooth-tongued, fawning + *amour*, Fr. *amour*, love). A bombastic knight in Spenser's *Faerie Queene*. His adventures are dealt with in the beginning of the fourth book of the poem. He is intended for the Earl of Northumberland, one of the leaders in the revolt of 1569.

BLAN'DIMAN. A character in the romance of *Valentine and Orson*, a Fifteenth-Century story of the Charlemagne cycle.

BLANDRATA, blän-drä'tä, properly **BIANDRATA**, byän-drä'tä, GIORGIO (c.1515-c.90). An Italian Unitarian. He was born at Saluzzo, Piedmont. He practiced at Pavia, but, suspected of heresy, was compelled to escape to Geneva. Here his anti-Trinitarian views, which persisted despite the *Responsum ad Quæstiones G. Blandratos* (1559) of Calvin, involved him in violent controversy with the latter. From Geneva he went to Poland, and subsequently to Transylvania, where he became physician-in-ordinary to the Prince John Sigismund, whom he numbered among his converts. In both countries he was the first to introduce the doctrines of Unitarianism. In 1566 he defended his doctrines against Reformed theologians in public disputation. His most important work, the *Confessio Antitrinitaria*, was edited by Henka (1794). Consult Malcarne, *Commentario della Opere di Giorgio Biandrata* (Padua, 1814).

BLANGINI, blän-jē'nē, GIUSEPPE MARIA FELICE (1781-1841). An Italian composer. He was born in Turin, and went to Paris in 1799, where he composed romanzas, canzonettas, nocturnes, and also several operas, the most celebrated of which was entitled *Neftali*. In 1809 he was called to Cassel as *kapellmeister* to King Jerome of Westphalia, and it was here that the work to which he owes his fame, *La Fée Urgèle*, was written. He composed, in all, about eighteen operas and more than two hundred smaller compositions.

BLANKENBERGHE, bläṅ'ken-bĕrk'. A favorite seaside resort in the Province of West Flanders, Belgium, on the North Sea, 9 miles north of Bruges, and 12 miles northeast of Ostend. It has a fine beach, a paved promenade along the sand-dunes 22 yards wide and over a mile in length, handsome residences, and a casino with a concert-room to accommodate 4000 persons. Its popularity dates from 1840, and it is now visited annually by over 25,000 tourists. Permanent population, in 1899, 4297.

BLANKET (Fr. *blanchet;* originally, a kind of white woolen stuff, dimin. of *blanc*, white; cf. Eng. *blank*). A sheet of heavy woolen or partly woolen cloth, which is used for beds, for horse-coverings, and to wrap around the person. In the early years of the last century, especially from 1812 to 1815, the manufacture of blankets in the United States was confined to the production of coarse qualities, chiefly for the military and naval forces. The War of 1812 gave a great impetus to woolen manufactures, and factories sprang up everywhere; but with the restoration of peace these enterprises met with disaster because of the superior goods that were imported at much lower prices. In 1831 a large mill for the manufacture of cotton-warp blankets for the use of slaves was erected near Pendleton, S. C. It is said that in the same year a factory was built near Buffalo, N. Y., for the manufacture of Mackinaw or Indian blankets. In 1860 the census reports stated that the manufacture of blankets was carried on in nineteen different States, and that the total output was 616,400 blankets, which were produced chiefly in Maine, Massachusetts, New Hampshire, Pennsylvania, and California. The manufacture of blankets increased largely during the Civil War and in the years immediately following, and the importations decreased proportionally. Since that time the values of the finer grades of white bed-blankets have become much reduced, and the production of the poorer qualities discontinued. In the last twenty years great advances have been made in the manufacture of blankets, and those of lighter weight, but more fleecy finish, are preferred to the heavy grades of former years. The finest grades are manufactured in California and Oregon, the best blankets costing over $20 per pair, or more than $2 per pound. All-wool blankets can be obtained from $7.50 upward, while cheap blankets can be bought as low as $2 a pair.

The best blankets are made wholly of wool, but those of medium or inferior qualities are formed of cotton warp and woolen filling threads, the aim of the manufacturer being to raise the fibres of the woolen yarn into a loose, soft mat on the face of the blanket so as to hide the threads below. Extraordinarily fine woolen blankets are made in Mysore in India, some of which, it is said, are so delicate that, though 18 feet long, they can be rolled inside a hollow bamboo. Such fancy blankets cost about $150. The blankets made by the Navaho (q.v.) Indians of northern Arizona and New Mexico are much sought after where durability and warmth are desired. The Navahos occupy a reservation of 8,000,000 acres in northern Arizona and New Mexico; they are the most civilized of the Indian tribes, and number about 16,000. They possess about 1,000,000 sheep, which they raise for their wool to make into blankets. The wool which comes from their flocks is rudely carded and spun on a spindle resembling a boy's top. The loom consists of two horizontal beams, one hung above the other and the warp stretched between. The shuttle is a stick. The colors most used are black, red, blue, and yellow; the patterns are geometrical designs. The value of a Navaho blanket depends upon its weight. The average weight is twenty pounds, and the value in 1900 was from $1 to $2 per pound. They were much sought after by emigrants to the Klondike. Blankets are also made by other Indian tribes of the Southwest, and specimens are shown in the accompanying colored plate.

BLANK VERSE (refers to absence of rhyme; probably from *blank*, lacking a part necessary for completeness, as e.g. in 'blank' cartridges, containing powder but no ball). Verse without rhyme. The typical line contains five feet, or

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INDIAN BLANKETS

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measures, each measure having two syllables. A stress of the voice, varying in degree, comes regularly on the second syllable in each measure, though this stress is frequently thrown back upon the first syllable. Still greater ease of movement is attained by an extra syllable at the end of a line or before the cæsura. Any measure may also contain three syllables, and measures occur in which there is only one syllable. This structure may be illustrated by *Macbeth:*

This cás | tle háth | a pléas | ant seát; | the aír
Nímbly | and swéet | ly ré | commênds | itsélf
Unto our gén | tle séns | es. | This guést | of sûm | *mer*, etc.

Again:

The mûl | titû | dinous séas | incár | nadíne.

The classical productions of the Greek and Roman poets—at least such of them as have come down to us—are composed without rhyme; and, accordingly, when the passion for imitating classical models set in, rhyme came to be looked upon as an invention of Gothic barbarism, and attempts were made in several countries to shake it off. The first specimen of blank verse in English is a translation of the second and fourth books of Vergil's *Æneid*, by the Earl of Surrey, who was executed in 1547; but it had been used by Italian and Spanish writers as early as about the beginning of that century. Surrey derived it from Italy. First employed in the drama by Sackville in *Gorboduc* (1561), it was perfected by Marlowe and Shakespeare. It has since continued dominant in our poetic drama, if we except the effort made by Dryden and others, after the Restoration, to return to rhymed plays. But in other kinds of poetry, it was not till the appearance of *Paradise Lost* (1667) that it could be said to have taken root; and even then the want of rhymes was felt, as the poet expected it would be. Many poets have since followed Milton's example; and English narrative, didactic, and descriptive poetry is partly in blank verse, partly in rhymed couplets. Of recent poets, Tennyson and Browning have written the best blank verse. In Italian and Spanish it never became popular, and still less in French. But under the influence of the English example, it was introduced into Germany by Lessing and others. Consult: Mayor, *Chapters on English Metre* (London, 1886, revised ed., 1901); and J. Schipper, *Englische Metrik*, Part II. (Bonn, 1888). See RHYME.

BLANQUI, blän'kē', JÉRÔME ADOLPHE (1798-1854). A French economist. He was born in Nice, November 28, 1798. After 1814 he pursued his studies in Paris, where, under the influence of J. B. Say, he turned to political economy. Upon Say's recommendation, he was appointed in 1825 professor of history and of industrial economy in the Commercial School in Paris. On the death of Say he was appointed professor of industrial economy in the Conservatoire des Arts et Métiers, and was one of the editors of the *Dictionnaire de l'industrie manufacturière, commerciale et agricole*. At the instance of the Academy of Moral and Political Sciences he prepared studies of economic conditions in Corsica, Algeria, and in England. He died in Paris on January 28, 1854. His principal works are: *Résumé de l'histoire du commerce et de l'industrie* (Paris, 1826); *Précis élémentaire d'économie politique, précédé d'une introduction historique, et suivi d'une biographie des économistes*, etc. (1826); and, most important of all, the *Histoire de l'économie politique en Europe, depuis les anciens jusqu'à nos jours suivie d'une bibliographie raisonnée des principaux ouvrages d'economie politique* (4th ed., 1860).

BLANQUI, LOUIS AUGUSTE (1805-81). A French revolutionist and a member of the Paris Commune. He was a brother of Jérôme Adolphe Blanqui (q.v.), and was born at Puget-Théniers, in the Department of Alpes-Maritimes, February 7, 1805. While studying law and medicine in Paris, he became closely identified with the Revolutionary movement, and took an active part in the disturbances which led to the overthrow of Charles X. He became one of the most prominent leaders of the Parisian proletariat and an irreconcilable enemy of the bourgeoise government of Louis Philippe. With Barbès (q.v.) he was the instigator of the insurrection of May 12, 1839, and as a result was condemned to death, the sentence being commuted, however, to imprisonment for life. The February Revolution set him free. He was one of the leaders of the mob which, on May 15, 1848, attempted to storm the hall of the National Assembly, and was condemned to ten years' imprisonment. Liberated in 1859, he lived in London for some time, and returning to Paris in 1861, speedily succeeded in incurring a sentence of four years' imprisonment as an instigator to riot. In 1871 he took part in the insurrection which led to the establishment of the Paris Commune, and became subsequently a member of the Communal Government. After the taking of Paris by the troops from Versailles, Blanqui was sentenced to transportation to New Caledonia; but in consideration of his infirmities, the aged man was sent to prison instead. He was pardoned in 1879, and died January 1, 1881. With Armand Barbès, whose coadjutor he was in the events of 1839 and 1848, Blanqui stands out as the type of the fanatic reformer engendered by the French Revolution and the democratic movement of the Nineteenth Century. Idealist and fighter in one, with no recognition for the limitations of actuality, he was but a lineal descendant of the men of 1793, who attempted to regenerate the world through terror. The sincerity of his beliefs was attested by nearly half a lifetime spent in prison. Blanqui was the author of a scientific work entitled *L'éternité dans les astres* (1872). His writings on economic subjects were published in 1885, under the title of *Critique sociale*. The name Blanquistes is now borne by the radical wing of the Socialist Party in France.

BLANQUILLO, blân-kēl'yô (Sp., whitish, dimin. of *blanco*, white). A fish of the family Latilidæ (see TILE-FISH), which inhabit warm seas. A common species in southern California is the yellow-tail (q.v.), but the name is most specifically applied to the reddish *Caulolatilus chrysops* of the Gulf of Mexico.

BLANTYRE'. The chief town of the British Central Africa Protectorate (q.v.).

BLAR'NEY (Irish *blairne*, a little field, from Gael. *blair*, *blar*, a plain). A village in Ireland, four miles from Cork, having a castle built in 1449, by Cormac McCarthy. Near the castle are the 'Groves of Blarney,' and on the summit of the castle-tower is the Blarney Stone, the kissing of which is said to endow one with the gift of coaxing, wheedling, and flattering. The true stone, however, is one set into a wall, where it

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can be kissed only by a person held over the parapet. The name has given a noun, a verb, and a participle to the English language.

BLARNEY, Lady. A woman of bad character in *The Vicar of Wakefield*, introduced to the Primroses by Thornhill to aid in the seduction of Olivia.

BLÄSER, blĕ'zĕr, Gustav (1813-74). A German sculptor. He was born in Düsseldorf, and in 1833 entered the studio of Rauch, with whom he remained for eleven years. In 1845 he went to Rome, whence he was called to Berlin to design one of the eight marble groups adorning the *Schlossbrücke*, a task in which he was eminently successful. The group executed by him, and entitled "Minerva Leading a Youthful Warrior into Battle," is considered the best of the series. His subsequent works include: "Saint Matthew, the Apostle," a statue of colossal proportions (church at Helsingfors); "The Prophet Daniel" (Royal Castle, Berlin); "Borussia" (New Museum, Berlin); the equestrian statue of Frederick William IV. (Rhine Bridge, Cologne); "Hospitality" (National Gallery, Berlin); and busts of Emperor William I., the Empress of Russia, von Alvensleben, von der Heydt, Alexander von Humboldt, Rauch, Abraham Lincoln (Washington), and many others.

BLASH'FIELD, Edwin Howland (1848—). An American painter. He was born in New York City, December 15, 1848. He studied in Paris under Bonnat. It is for decorative work on a large scale that he is chiefly noted. Among his paintings in public buildings may be mentioned a dome in the Manufactures Building at the Columbian Exposition, and a decoration for the Appellate Court of New York. He has also decorated ceilings in private houses. For several successive years he was represented at the Paris Salon and also at the Royal Academy. Among his paintings are "Christmas Bells" and "The Angel with the Flaming Sword." One of his most important works is the decoration of the dome of the Congressional Library in Washington.

BLA'SIUS, or **BLAISE.** A saint and martyr of the Roman Catholic Church. He was Bishop of Sebaste, in Cappadocia, when Licinius began a bloody persecution of the Christians. Blasius left the town, and concealed himself in an unknown chasm in the rocks, but his abode was discovered by the prefect, Agricola, while out hunting. The saint was conveyed to Sebaste, and as he steadfastly refused to deny Christ and worship the heathen gods, he was first scored with iron combs and then beheaded (316). At one period his worship must have been widely diffused, judging from the extent of territory over which his relics were scattered. The wool-combers claim him as their patron, for the singular reason that he was tortured, among other instruments, with a wool-comb. The practice of invoking Saint Blasius in cases of sore throat is said to have originated in the circumstance that, when young, he saved the only son of a rich widow from being choked by a fish-bone. Saint Blasius's day is the 3d of February.

BLASIUS, blä'zē-ŭs', Le Docteur. One of the many pseudonyms of Paschal Grousset.

BLASNAVAC, or **BLASNAVATZ,** bläs'nä-vats, Milivoye Petrovitch (1826-73). A Servian soldier and statesman. He was born at Blasnava (District of Kraguyevatz), and studied in Berlin in 1848. Upon the outbreak of the Hungarian Revolution (1848), he joined the volunteer corps of General Knitchanin against the Hungarians, and commanded the Servian artillery until the close of the war. After the accession of Prince Michael Obrenovitch to the throne of Servia, Blasnavac was appointed colonel (1862) and Minister of War (1865), in which capacity he created a national militia of 80,000 men. After the assassination of Prince Michael (June 10, 1868), he proclaimed Milan as Prince of Servia, and maintained the public order. He was a member of the Regency during the minority of Prince Milan, and upon the accession of the latter to the throne (August 22, 1872) was appointed president of the Ministry.

BLASPHEMY (Gk. *βλασφημία, blasphēmia*, 'speech or word of evil omen'). As a criminal offense at common law, blasphemy consists in maliciously reviling God or the Christian religion. As a sin, it was punishable by the ecclesiastical courts of England; and even in the United States, where such courts are not a part of the machinery of government, it still may subject the blasphemer to expulsion from a church or religious society.

Two reasons are assigned by the courts for treating blasphemy as a crime: (1) It tends to produce a breach of the peace by leading to violent altercations between the blasphemer and those who are shocked and outraged by his language. (2) Christianity is a part of the common law, and therefore blasphemy tends to subvert the law and to destroy the very foundation of civil society. Because of its offensiveness to the majority of virtuous people, and because it is considered injurious to the tender morals of the young, it is often spoken of by judges as a public nuisance, and when it is written or printed, it is deemed a libel (q.v.).

Formerly, any attack upon Christianity or any argument against its fundamental doctrines, as those were understood by the Established Church, amounted to the crime of blasphemy; but a different view now prevails both in England and in the United States. It is the manner rather than the matter of the publication that renders it blasphemous. Lord Chief Justice Coleridge declared in 1883, in one of the few modern cases on this subject, that "if the decencies of controversy are observed, even the fundamentals of religion may be attacked without a person being guilty of blasphemous libel." Similar views had been expressed still earlier by Chancellor Kent in New York and Chief Justice Shaw in Massachusetts. The latter had defined the crime as "a willful and malicious attempt to lessen men's reverence of God," and the former had defined it as consisting "in maliciously reviling God and religion." In line with these opinions is the following statement from a decision of the Supreme Court of Pennsylvania: "No author or printer, who fairly and conscientiously promulgates opinions with whose truths he is impressed, for the benefit of others, is answerable as a criminal. Audacious and mischievous intention is, in such a case, the broad boundary between right and wrong; it is to be collected from the offensive levity, scurrilous and opprobrious language, and other circumstances, whether the act was malicious." A sober, serious, and reverent statement of one's honest opin-

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ions, however heretical, is not at present criminally blasphemous. Undoubtedly, the provisions in the Federal and State Constitutions, guaranteeing religious freedom and securing the liberty of speech and the press, have helped to modify the judicial conception of this crime.

While blasphemy is still a crime in England and in most of the United States, prosecutions for the offense have become very rare. Though always punishable, it is seldom punished. In some of the United States it has ceased to be a crime. Such seems to be the case in New York.

See Stephen, *History of the Criminal Law of England* (London, 1883); also the *Encyclopædia of the Laws of England*, Vol. II., page 172 (London); Bishop, *New Commentaries on the Criminal Law* (Chicago, 1892); and the *New York Penal Code*, Chapter 676, Laws of 1882, § 2.

BLASS, blâs, FRIEDRICH WILHELM (1843—). A German classical philologist, born at Osnabrück, Hanover. He was professor in the University of Kiel from 1881 to 1892, and joined the faculty of the University of Halle in 1892. His works include: *Die attische Beredsamkeit* (3 vols., 2d ed., 1887-98); *Die Aussprache des Griechischen* (3d ed., 1888); *Plutarch, Tiberius, und Gaius Gracchus* (1875); *Grammatik der neutestamentlichen Sprache* (1896); *Philology of the Gospels* (1898). He also edited the orations of Æschines, Andocides, Antiphon, Demosthenes, Dinarchus, Hyperides, Isocrates, and Lycurgus; *Bacchylidis Carmina* (1898); *Acta Apostolorum* (1894-96); *Evangelium Lucæ* (1897); Aristotle's *Ἀθηναίων Πολιτεία* (2d ed., 1895); revised Kühner's *Grammatik der griechischen Sprache* (I. 1, 2, 1890-92); and is a frequent contributor to philological journals.

BLAST-FURNACE. See IRON AND STEEL.

BLASTING (AS. *blæst*, OHG. *blâst*, a blowing; cf. OHG. *blâsan*, breathe, snort, Ger. *blasen*, to blow, Engl. *blaze*, to spread a report, just like the slang *blow*). The process of breaking up rock, ores, and other fracturable material by means of explosives. It is extensively employed in engineering works generally, and in quarrying and mining operations particularly. Previous to 1613 the means of loosening and breaking up rock in these operations were the hammer, chisel, and wedge, and the process of fire-setting, which consisted in heating the rock surface by building wood-fires against it and then quickly cooling it with water, the sudden contraction thus produced causing the material to spall off and crack open to a limited depth. The first attempt to blast rock by the use of an explosive is commonly credited to Martin Weigel, a mine boss at Freiberg, Saxony, and is said to have occurred in the year 1613. Whether this date is accurate or not, it is quite certain that any previous attempts at blasting were so exceptional that they did not come to the notice of the several writers on mining of that early date. Whatever may have been the date of the first attempt at blasting, however, it is certain that by 1634 to 1644 the use of gunpowder in mining operations was quite generally known in Germany. From that country the process was taken by German miners to England in 1670, and to Sweden in 1724. Until 1685 the drill-holes were stopped with wooden plugs, but in that year clay-tamping was employed in Saxony. In 1791 sand-tamping was first used. Hand-drilling with cone and crown drills was used until 1759, when the modern chisel-edge drill was introduced. In 1829 Moses Shaw, of New York, first fired blasts by electricity, and in 1831 Bickford, an Englishman, invented the match or fuse now known by his name. (See FUSE.) In 1849 Mr. J. J. Couch, of Philadelphia, Pa., invented the first power percussion drills. (See DRILLS.) In 1863 nitroglycerin, and in 1867 dynamite, were first used as explosives in blasting operations. See EXPLOSIVES.

Modern blasting operations may be divided into three classes: (1) small-shot blasting, in which comparatively small volumes of rock are moved at a single blast; (2) blasting by mines, in which large masses of rock are broken up by a single heavy blast; and (3) surface-blasting, in which the explosive is placed on or against, or simply near to, the rock to be broken up, and which is possible only with very high explosives. Small-shot blasting is employed in the great majority of quarrying, mining, and engineering operations. It consists in piercing the rock with a comparatively small number of drill-holes from 1¼ inches to 3 inches in diameter and from 18 inches to several feet in depth; charging these holes with explosives, generally blasting-powder or dynamite, with the proper fuse or electric-wire connections; tamping the space above the explosive with earth, sand, clay, or water, and finally firing these charges by means of a time-fuse or wires from an electric battery or magneto-machine. The relative location of the drill-holes, their size and depth, and the amount of explosive used vary according to the object which it is sought to accomplish by the blast. Where the purpose is merely to break up the rock in the most efficient manner for its removal, as in excavating a foundation, the holes will be placed quite close together and heavily charged, so as to shatter the rock thoroughly. In quarrying, where the object is to loosen the rock in large and regularly shaped masses, the holes are arranged in rows and lightly charged, so that the explosion will split the rock along approximately definite lines without shattering it. In tunnel-work, the object is to take out a cylindrical mass of rock the size of the tunnel cross-section. This is usually accomplished by drilling and firing a small number of converging holes so as to take out a cone-shaped or wedge-shaped centre core, and then to enlarge this opening by drilling and blasting successive rings of holes surrounding this centre opening. In excavating a canal through rock, a row of holes is usually drilled transversely across the canal so as to throw down and break up a slice or section of rock extending from one side of the channel to the other. See TUNNELS; QUARRYING; and CANALS.

Blasting by mines is employed when great ledges of rock have to be removed at one operation, or where a large quantity of broken stone is required. Mining is usually accomplished by sinking vertical shafts into the top of a cliff, or by driving similar shafts horizontally into its face, or by a combination of the two methods. The methods of blasting by mines will be better explained by describing a number of typical blasts of this sort than by a general discussion of processes. In the work of removing the rock-obstruction of the Danube River known as the 'Iron Gates' a vertical cliff, Greben Point, was

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removed by a succession of notable mine-blasts. The largest of these blasts was made in May, 1894. A tunnel 3 × 4 feet in cross-section and 80 feet long was driven into the face of the cliff and enlarged at its inner end into a 6 × 6 ×6-foot chamber. This chamber was filled with 12 tons of second-grade dynamite, the tunnel packed with loose rock, and closed with a brick masonry wall. The firing of the blast removed about 78,000 cubic yards of rock. To break down the face of a quarry at South Bethlehem, N. Y., in 1889, 50 vertical holes 30 feet deep and 7 feet apart were driven near the edge of the cliff, and charged with 40 pounds of dynamite each. This blast displaced between 20,000 and 25,000 tons of rock. In a similar blast at Crarae Quarry in Argyllshire, Scotland, in 1886, a blast of 14,000 pounds of powder dislodged 60,000 tons of granite rock. To secure a large quantity of rock for building a dam near Teller, Colo., a granite mound known as Vesuvius Butte was blown up on December 18, 1899. A horizontal tunnel, with several angles to prevent the blowing out of the blast, was driven into the side of the butte near its bottom until the inner end was about at the centre of the butte. From the end of this tunnel a horizontal tunnel 70 feet long was driven to the right and to the left, so that the whole excavation formed a T-shaped tunnel. The ends of the cross-arm of the T were packed with some 32,000 pounds of black powder and the remaining space filled with rock and earth. The main tunnel was also packed with earth, with green timber bulkheads placed at each angle. This blast was fired by electricity, and its explosion opened up a crater 72 feet deep and 150 feet in diameter, and broke up 110,000 cubic yards of rock. By far the largest blast ever made was fired in connection with the removal of Hell Gate Rock in the East River at New York in 1876. This rock had an area of about 9 acres, and to remove it 24 longitudinal and 46 transverse galleries or tunnels, with their faces pierced with 12,561 holes 3 inches in diameter and 9 feet deep, were excavated in its interior. Into each drill-hole was inserted a rack-a-rock cartridge, and then a dynamite cartridge, in all 240,399 pounds of rack-a-rock and 42,331 pounds of dynamite, and then water was admitted to the mine. The blast was fired by electricity, and removed 270,717 cubic yards of rock, while about 80,000 cubic yards of rock had been taken out in excavating the galleries.

Surface blasting is possible only with high explosives, such as nitroglycerin, dynamite, or guncotton, which explode by detonation so suddenly that the shock is transmitted with shattering effect to the rock with which it is in contact. Gunpowder, when fired in an unconfined space, explodes so slowly that its force is expended through the air without producing any effective local shock. Surface blasting has been extensively used in removing reefs and similar obstructions to navigation in Long Island Sound. Small-shot submarine blasting is frequently used for similar work, and the method is well illustrated by the following typical example. In removing a submarine ledge in Oswego (N. Y.) Harbor in 1893, a drill-scow 82 × 26 × 6½ feet was employed, along one side of which was a track carrying two movable drill-frames. Each drill-frame carried a percussion drill operated by steam, the drill-rod of which descended down the side of the scow. The holes were drilled 5 feet apart in rows of 14 holes to a depth of from 4 feet to 7 feet, and charged with 2 × 18-inch dynamite cartridges, weighing 2¾ pounds, and containing 75 per cent. dynamite. The entire 14 holes were fired by electricity in one blast.

In charging the drill-holes with explosives for blasting, the method now in use is to employ the explosive in the form of cylindrical cartridges. Formerly, and more particularly in case gunpowder was used, the explosive was placed in the hole in powdered form. All high explosives are now fired by electricity, several holes being fired simultaneously. As each hole is charged, a detonator or cap with two wires attached is inserted in the top of the cartridge. The first wire of the first hole runs to the battery, as does the last wire, the other wire being used to connect several holes with each other. When the first and last wires are secured to the poles of the firing-battery or frictional electric machine and the current passed through them, the detonators or caps in the cartridges are exploded by the current, and in turn cause the explosion of the cartridge. Where a time-fuse is used, the end of this fuse is inserted into the detonator, which is itself inserted into the top of the cartridge; the outer end of the fuse is then lighted and the fire follows the fuse until the detonator is reached and exploded, thus causing the explosion of the cartridge. For a comprehensive discussion of blasting operations, consult: Drinker, *Tunneling, Explosive Compounds and Rock Drills* (New York, 1874); for a more concise description, in Prelini, *Tunneling* (New York, 1901). See EXPLOSIVES.

BLASTOIDEA. See PENTREMITES.

BLA'TANT BEAST, THE (archaic *blate*, to babble, prate; cf. Engl. *bleat*, the cry of sheep). Spenser's personification of slander, in the *Faerie Queene*. It is temporarily muzzled by Artegal, and Calidore afterwards seeks its death.

BLATCH'FORD, SAMUEL (1820-93). An American jurist. He was born in New York City, graduated at Columbia in 1837, and was admitted to the bar in 1842. In 1845 he went to Auburn and joined William H. Seward and Christopher Morgan as a law partner, but returned to New York in 1854, and was appointed district judge of the United States Court for the Southern District of New York in 1867, and circuit judge for the Second Circuit in 1878. In 1882 President Arthur appointed him an associate judge of the United States Supreme Court.

BLATCH'LEY, WILLIS STANLEY (1859—). An American naturalist and geologist, born at North Madison, Conn. He graduated at Indiana State University in 1887; was a member of Scoville's scientific expedition to Mexico (1891), of the Arkansas Geological Survey (1889-90), and of the United States Fish Commission (1893). In 1894 he became State Geologist of Indiana. The following are some of his publications: *Gleanings from Nature* (1899); "How Plants and Animals Spend the Winter," in *Popular Science Monthly* (New York, 1897); "Some Indiana Acrididæ," in *Canadian Entomology* (London, 1891); "Locustidæ and Blattidæ of Indiana," in *Proceedings of the Indiana Academy of Science* (Brookville, Ind., 1892); and numerous contributions as editor of Vols. XX.-XXV. of the *Annual Reports, Department of Geology and*

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Natural Resources of Indiana (Indianapolis, 1895-1900).

BLATH'WAYT, WILLIAM (c.1649-1717). An English statesman. He was born at Saint Martins-in-the-Fields. He accompanied James II. and his army to Salisbury in the capacity of Secretary of War, in November, 1688, and seems to have conducted nearly all the affairs of the army. Owing to his linguistic attainments he became a favorite with William III., whom he accompanied on his campaign in Flanders. He was a member of Parliament almost uninterruptedly from 1685 to 1710.

BLAT'TIDÆ (Lat. *blatta*, cockroach, moth). A family of cursorial Orthoptera, including the ordinary cockroach. The Blattidæ are the oldest known insects, being found as fossils in the Middle Silurian of France. See COCKROACH.

BLAUBOK, blou'bŏk, or BLUEBUCK (Dutch *blauwbok*, blue buck). A large hippotragine antelope (*Hippotragus niger*) of South Africa, distinguished by its glaucous hue. Its long, stout horns sweep back from its forehead in a sabre-like curve, and are effective weapons. Closely related are the magnificent, jet-black sable antelope (*Hippotragus niger*), the equine antelope (*Hippotragus equinus*), and Baker's antelope (*Hippotragus Bakeri*) (q.v.). All have been growing rare, and it is feared that since 1900 the blaubok has been extinct.

BLAURER, blou'rēr, or **BLARER,** AMBROSIUS (1492-1564). A German religious reformer. He was born at Constance, and studied at the University of Tübingen. In 1515 he entered the Benedictine monastery at Alpirsbach, where he afterwards became prior. In consequence of his advocacy of the doctrines of Luther, however, he was deposed in 1521. He then became a Protestant preacher at Constance, and was sent to regulate the ecclesiastical affairs at Memmingen (1528) and Ulm (1531). In 1534 Duke Ulrich summoned him to Württemberg, where, during a period of four years, he introduced the principles of the Reformation into the Church, his sphere of activity embracing 62 towns and 450 villages. In consequence of his leaning toward Zwingli, however, he was, at the instigation of the extreme Lutherans, dismissed from his office. Afterwards he expounded the new doctrine in Isny, Lindau, and Augsburg. In addition to numerous letters, which are valuable as historical documents, he left a number of writings bearing upon the Reformation. For his biography, consult: Keim (Stuttgart, 1860); Pressel (Elberfeld, 1861).

BLAUVELT, blou'vĕlt, LILLIAN (c.1870—). An American singer, born in Brooklyn, N. Y. She early appeared as a violinist, subsequently studied vocal music with Bouhy in Paris, and appeared at the Théâtre de la Monnaie, Brussels, in *Faust* and other operas. Afterwards she sang in concert and oratorio, and has continued solely in those fields. Her début in England was made in 1898 at the Queen's Hall symphony concerts. She has sung throughout Europe, in the United States, and in Canada.

BLAVATSKY, blä-väts'kê, HELENA PETROVINA HAHN-HAHN (1831-91). A Russian traveler and theosophist, born in Yekaterinoslav, Southern Russia. She traveled widely, penetrated to Tibet, and originally dealt much in spiritism and the occult. In 1873 she came to the United States, where, with H. S. Olcott, she in 1875 founded the Theosophical Society. In 1879, under her direction, a branch of the society was organized at Bombay, India, and the official journal, *The Theosophist*, was established. She met numerous 'adepts' in India and elsewhere, and did somewhat to popularize the content of Buddhist philosophy alike among foreigners and native Indians; but the imposture of her miraculous pretensions has been adequately demonstrated by V. S. Solovyoff in his work, *A Modern Priestess of Isis* (trans. by W. Leaf, London, 1895), and by the investigations of the Society for Psychical Research in 1884. Although but slightly acquainted with Sanskrit, she wrote voluminously on the ancient esoteric doctrines of India. The accredited text-book of her disciples is her *Isis Unveiled* (1876), which displays the subtitle, "A Master Key to the Mysteries of Ancient and Modern Science and Theology." Consult Olcott, *Old Diary Leaves* (New York, 1895). See THEOSOPHY.

BLAY'DON. A coal-mining town in Durham, England, on the right bank of the Tyne, 4½ miles west of Newcastle (Map: England, E 2). Its municipal life is active; it owns its water-supply, maintains a technical school, and has fine modern public buildings. Population, in 1891, 13,200; in 1901, 19,600.

BLAZE DE BURY, blàz' de bụ'rê', ANGE HENRI (1813-88). A French author. He was born in Avignon, and was a son of the author Castil Blaze. In 1839 he published his first comedy in verse, *Le Souper chez le commandeur*, the first of a series of contributions to the *Revue des Deux Mondes*, with which publication he was associated for forty years. Under the influence of the Romanticists he devoted himself to the study of German literature, and in 1840 published his translation of Goethe's *Faust* (14th ed. 1880), a work which obtained a wide circulation. His other works on the German poets include *Ecrivains et poètes de l'Allemagne* (1846); *Les poésies de Goethe* (1862); *Les écrivains modernes de l'Allemagne* (1868). His wife, Madame PAULINE ROSE STEWART BLAZE DE BURY, was well known as a writer under the pseudonyms 'Arthur Dudley' and 'Maurice Flassan.' She also published, under her own name, *Voyage en Autriche, en Hongrie et en Allemagne* (1851).

BLA'ZONRY. See HERALDRY.

BLEACHING (AS. *blæcan*, to grow pale, Ger. *bleichen*, to whiten; cf. E. *bleak*, Ger. *bleich*, pale, AS. *blāc*, *blæc*, pale, shining). The art of removing coloring matters from animal and vegetable substances, leaving the material uninjured but of a light or white color, so that, as in the case of fabrics, they may be readily dyed to some desired shade. The origin of bleaching is unknown, but the art is believed to have been practiced before the Christian Era, and the 'fine linen' mentioned in the Bible is supposed to have been bleached. It is thought to have been practiced by the ancient Babylonians, Egyptians, and other Eastern peoples, and was for the most part applied to vegetable fabrics, such as flax, hemp, and cotton, or the cloths made from them, although the bleaching of silk has long been known in China. Originally, the atmosphere and the sun's rays alone were used for bleaching, and the plan followed was to spread the cloth on a grass-field

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called a *bleaching-green*. The fabric was sprinkled with water several times a day, and after several months of exposure it became white. No improvements of importance occurred until the Eighteenth Century, when Holland became the principal seat of the industry, and there the material was steeped in a solution of potash lye for several days and then in buttermilk for about a week, after which it was washed and bleached on the ground. The satisfactory results thus obtained led to the name 'Hollands' being given to the excellent fabrics bleached in that way, while a quality of linen, much in demand, which was spread on grass fields, was called 'lawn.' The next improvement was the use of dilute sulphuric acid in place of buttermilk, by which the duration of the process, formerly about eight months, was reduced to one-half that time. In 1785 the remarkable bleaching properties of chlorine were discovered by Berthollet, and its application to the bleaching of cloth soon followed. At first the chlorine was used in its gaseous state, and it was found that it destroyed color by uniting chemically with the coloring principle, thus decomposing the color; but as the chlorine also united with the hydrogen of the fibre it destroyed the fabric. Subsequently javelle-water, obtained by dissolving chlorine in dilute potassium hydroxide, was employed; but in 1799 the dry chloride of lime, or bleaching-powder, came into use, and is still largely employed, although for some purposes hydrogen peroxide is now preferred.

COTTON-BLEACHING. When yarn and thread are bleached, the process consists in boiling the material in a dilute solution of caustic alkali and washing; then steeping in a solution of bleaching-powder and washing, after which it is steeped in sulphuric acid and again washed, then heated in a soap solution with the addition of a small quantity of bluing, after which it is passed through a dumping-machine consisting of wooden rollers, containing a solution of indigo, then washed and dried again. In the case of cotton cloth or calico the process is somewhat more complicated, but consists essentially in the treatment of the material in baths of lime, lye, bleaching-powder, and sulphuric acid, with thorough washing after each step. The most recent improvement in this process has been the substitution of caustic alkali and resin soap for the lime-boil as the initial step. It should be mentioned that an electric bleaching process has been introduced, the principal feature of which is that the bleaching liquid, as hypochlorite, is obtained by passing an electric current through solutions of calcium or magnesium chloride.

LINEN-BLEACHING. The process employed for removing colors from linen is similar to that employed for cotton, although the natural impurities are greater in the flax-fibre than in the cotton. These are rendered soluble by alkaline boilings, after which the coloring matters that still remain are oxidized and destroyed by baths of hypochlorites, or bleaching-powder. It is sometimes found desirable, especially when linen cloth is bleached, to introduce a step called *grassing*, which consists in exposing the material in a field to the action of air, light, and moisture for several days. It is believed that by this method the full strength of the fibre is more completely retained. In linen-bleaching the treatment of the yarn varies slightly from the treatment of the cloth, the latter being somewhat more extended.

WOOL-BLEACHING. The special feature in which this differs from the preceding methods is in the preliminary process, which is called *scouring*. Wool-fibre usually contains from 15 to 70 per cent. of foreign matter, consisting of dirt, and especially of fatty matters secreted by the animal, called *yolk*. This is divided into two parts: (1) 'Wool perspiration,' which is soluble in water, and consists essentially of potassium compounds of *oleic* and *stearic* acids, thus constituting an important source of potash; and (2) a compound insoluble in water and composed of cholesterin in combination with fatty acids. The scouring process consists in dipping the loose wool on a frame into dilute alkaline solutions which form emulsions with the *yolk*, or in treating the wool to the successive action of fat solvents, such as carbon disulphide, and washing. When the wool-yarn is scoured the process is similar, although the machinery is somewhat different. Wool cloth is scoured by passing the material as an endless band through the scouring liquid, and then through a pair of squeezing rollers. Even after scouring, wool cloth retains a faint yellow tint, which is then removed by bleaching. This is accomplished by the action of sulphurous acid, which is formed by burning sulphur in a closed chamber while the scoured and washed material, still wet, is suspended on poles, or the woolen material may be immersed and moved about in a solution of sulphurous acid. After bleaching the materials are well washed, and any persistent yellow tint is neutralized by the addition of a preparation of blueing.

SILK-BLEACHING. Raw silk contains a gelatinous substance called *sericin*, or *silk glue*, which, with other calcareous and mineral matter, is removed by rinsing the silk in a warm bath of dilute hydrochloric acid, and then washing. This process, called *stripping*, is repeated until only a small portion of the gummy substance remains. The crude silk is then 'boiled off' for several hours in open boilers, after which the silk is well rinsed in a tepid solution of sodium carbonate, and finally in cold water. The crude material frequently loses as much as 30 per cent. by these operations. The bleaching process is similar to that described under *Wool-Bleaching*, and consists in exposing the wet scoured silk to the action of gaseous sulphurous acid. The use of hydrogen peroxide for bleaching silk is becoming more and more extensive. The method consists in steeping the silk in a dilute solution of hydrogen peroxide, made slightly alkaline with ammonia, until it is sufficiently bleached. The bleaching of paper-stock, as cotton and linen rags or paper, and the bleaching of straw, as well as the bleaching of animal products, as beeswax, feathers, hair, ivory, oils, and sponges, will be found described in special articles under the names of these products. Consult: J. Gardner, *Bleaching, Dyeing, and Calico-Printing* (London, 1884); and *Modern Bleaching and Finishing*, by a practical working bleacher (London, 1897). Works on dyeing usually contain special chapters on bleaching.

BLEACHING-POWDER, or CHLORIDE OF LIME. An important bleaching agent and disinfectant. The exact chemical nature of bleaching-

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powder has never been definitely established, but it is generally accepted to be a mixture of calcium chloride with calcium hypochlorite. The process for its manufacture patented by Charles Macintosh, of Glasgow, in 1799, is still largely employed, and consists essentially in the absorption of chlorine by dry lime. The chlorine-gas was for this purpose originally made by heating a mixture of salt (sodium chloride), manganese dioxide, and sulphuric acid in a glass or wooden apparatus. Subsequently, however, the process was simplified by heating hydrochloric acid, a by-product of the manufacture of soda, with manganese dioxide. The lime used is ordinary limestone calcined in any convenient kiln, and then slacked with water. It is spread on the floor of a stone or leaden chamber, into which the chlorine-gas is introduced. The absorption is considered complete when a sample of the product is found to contain about 37 per cent. of chlorine. As thus obtained, chloride of lime is a white or grayish-brown powder with a strong, pungent odor of chlorine, which is, however, destroyed in time, the substance gradually undergoing decomposition. Besides its use as a bleaching agent, as for the removal of metallic and other colors in calico-printing, chloride of lime is considered a valuable disinfectant.

BLEAK, or BLICK (from the pallid color of the scales). A minnow (*Alburnus alburnus*) of the family Cyprinidæ. It is about 6 inches long, and slender, resembling the dace, but darker on the back, with silvery sides and white fins. It inhabits in active shoals the streams of England and the Continent, spawning in May, and is much esteemed as food by anglers, and as a pet in the aquarium. The silvery substance beneath the scales is used for the manufacture of artificial pearls, as in several related fishes.

BLEAK HOUSE. The title of a novel by Charles Dickens (1852-53). It exposes the interminable delays in chancery. The name is that of Mr. Jarndyce's residence, which is said to have been drawn from a dreary house at Broadstairs, Kent, occupied by Dickens in summer. See SUMMERSON, ESTHER.

BLEB (allied to Engl. *blob*, *blub*). A circumscribed elevation of the superficial layers of the skin which contains fluid, usually serous in character. Blebs are really large vesicles or pustules, and occur in certain skin-diseases, as erysipelas, pemphigus, or erythema multiforma.

BLECHEN, blĕk'en, KARL EDUARD (1798-1840). A German landscape painter. He was born at Kottbus, and studied at the Berlin Academy. After a residence of several years in Italy, he established himself in Berlin in 1830, where he was appointed professor at the Academy of Fine Arts in 1835. Blechen was the earliest representative of the Berlin landscape school. His works include: "Villa Este;" "View near Narni;" "Villa Borghese;" "View of Naples," and "View at Tivoli."

BLEDOW, blā'dō, LUDWIG (1795-1846). A German chess-player, born in Berlin. He founded the Berlin chess-school, which flourished from 1837 to 1842, and where Heydebrand, Mayet, von der Lasa, Bilguer, and Hanstein contributed greatly to the development of the game. He established the first chess paper published in Germany (1846). His arrangement of the 100 games of the Syrian master Stamma was published by von Oppen (Leipzig, 1865). The extensive collection of chess literature which he had accumulated during his lifetime was bought by the Royal Library in Berlin.

BLEDSOE, blĕd'sō, ALBERT TAYLOR (1809-77). An American metaphysician and educational author. He was born in Frankfort, Ky.; graduated at West Point in 1830, and became a lieutenant of infantry, but resigned in 1832, and was professor of mathematics successively in Kenyon College, in Miami University, and in the universities of Virginia and Mississippi. During the Civil War he was Assistant Secretary of War in the Southern Confederacy. He was a frequent contributor to periodical reviews, and at the time of his death was editor of the *Southern Review* (Methodist). His published works include: *An Examination of Edwards on the Will* (1845); *Theodicy: or, Vindication of the Divine Glory* (1853); and *Philosophy of Mathematics* (1866).

BLEEDER. See BLEEDING.

BLEEDING (*hemorrhage*). One of the most serious accidents that can happen to an animal, and one which constitutes an anxious complication in surgical operations. As there is but a limited quantity of blood in the body (about one-tenth of the body's weight), and as the sudden escape of a large portion of it is sufficient to cause death, every one should be instructed as to the measures which experience has shown to be the most efficient for preventing a dangerous loss of blood. Bleeding may be either from a wounded artery or vein, or it may be in the form of a general oozing from a raw surface or a mucous membrane, or the blood may escape into the surrounding tissues or into a cavity like the pleura, and remain concealed.

ARTERIAL BLEEDING. This is recognized by the florid redness of the blood, and by its issuing from the cut vessel in jets. There are exceptions to this, however. When an artery has been tied, and bleeding occurs from below the ligature, the flow of blood is continuous and of a dark color. It is also dark during profound anæsthesia. If a large artery be wounded, the first gush of blood may prove fatal, but generally there are rapid and feeble pulse, frequent and irregular breathing, intense pallor; cold, moist skin, possibly nausea and vomiting, and prostration merging into unconsciousness, and the patient faints; the artery draws up within its sheath (see ARTERY); the blood, no longer impelled vigorously by the heart, clots between the cut end and the cellular tissue surrounding it; the inner and middle coats not only retract, but contract, and another clot forms within the arterial tube. These clots—which, with the faintness and the contraction and retraction of the artery, are termed natural *hæmostatics*—are sufficient in many cases to prevent a recurrence of the bleeding; but we must be prepared to adopt some of the many surgical or artificial means for restraining the flow of blood till adhesion (q.v.) can occur between the cut surface of the coats of the artery. The principal surgical means are: Immediate pressure, which may be applied by pressing the finger-tip on the place whence the blood is seen to flow, and may be kept up by pads secured with a bandage to the part; pressure on the artery above, or as it comes to the cut part, which requires some knowledge of anatomy, but not more than any intelligent person may

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easily acquire. Thus, pressing on the inside of the arm, about midway between its front and back, will press the brachial artery (q.v.) against the bone, and arrest any bleeding from wounds of the forearm and hand. Pressure on the middle of the groin with a thumb placed crosswise will control the stream of blood in the femoral artery, so that none can escape from any wound in thigh or leg below where the pressure is made. Pressure on the course of the vessel may be very efficiently effected temporarily by tying a handkerchief round the limb above where it is injured, and then inserting a stick and twisting it sufficiently tight. This is the principle of the original tourniquet, which was invented by Morel, a French surgeon, at the siege of Besançon, in 1674. (See TOURNIQUET.) The objections to pressure as a means of arresting hemorrhage are, that it is very painful, that it includes the vein, and thereby engorges the limb with blood, and may cause mortification if continued for any length of time. Actual cautery, or hot iron, is occasionally useful in bleeding from a bone, or at some points where pressure or ligatures cannot be efficiently applied. It is the oldest method of stopping bleeding, and until the Eighteenth Century was much in use. If used, the iron should be at a white heat, the wound pressed for an instant, and then the iron should be held in contact with the bleeding vessel. It causes an eschar or slough, with shriveling of the artery; and if the latter be small, it effectually stops the bleeding, until the eschar drops off, when the vessel may be found still pervious at the wounded part, and the danger of bleeding be as great as at first. Ligature, or tying the artery, is a very old method of arresting hemorrhage, and certainly the best. A ligature should be applied to each extremity of the cut artery. (See LIGATURE.) *Acupressure* (q.v.) was introduced by the late Sir James Y. Simpson of Edinburgh, and was extensively used. It is useful in a few instances where the arteries are too brittle to permit ligation.

VENOUS BLEEDING. This is recognized by the dark color of the blood, and its continuous flow. Pressure is generally found sufficient to arrest it, and it should be applied directly over the wounded part. Ligatures are used somewhat as in the case of arterial hemorrhage. Acupressure is rarely used. In the case of large venous trunks, or sinuses, the vessel is packed with a gauze plug.

CAPILLARY BLEEDING. This is distinguished by oozing, with a tendency to spontaneous arrest. It is rarely dangerous, except in hemorrhage from the mucous membrane of the stomach. Water at a temperature of 116° F. will arrest it, or cold, or the actual cautery. The old styptics (as alum, tannin, cobwebs, etc.) are not used by surgeons, as they cause unclean clots, which invite sepsis and secondary hemorrhage.

PARENCHYMATOUS BLEEDING. This occurs in organs wherein small arteries empty directly into veins without intervening capillaries, as the spleen. Hot water, or cold, or dilute acetic acid may arrest it. Transfusion of blood from another person, or introduction of salt solution into the venous system of the patient, is very frequently a resort in severe hemorrhage. Some persons have a congenital tendency to bleed (the hemorrhagic diathesis); if such a one have a trifling cut, or have a tooth pulled, he bleeds perhaps to death. A prudent surgeon will not perform cutting operations on one of a hemorrhagic family. See BLOOD.

BLEEDING, or BLOODLETTING. Blood may be drawn from a vein (phlebotomy—venesection), or from an artery (arteriotomy). The veins most commonly opened for this purpose are the median basilic (see ARM), but those of the lower limbs are occasionally selected. The patient should be placed sitting up in bed, as he may lose a dangerous amount of blood without showing the usual premonitory symptoms if his head be kept low. The venous return should now be obstructed by a bandage, and when the veins swell, one should be selected, steadied with the left thumb, and slit obliquely with a lancet; the blood allowed to flow till the desired quantity has escaped. The surgeon's thumb should now be placed on the cut in the vein, and kept there till the bandage is removed, when a small pad of lint of figure-of-8 bandage will sufficiently prevent the bleeding, and the wound will speedily heal. Phlebotomy was at one time habitually resorted to in inflammatory diseases, and even when there was no positive disease, it was often applied periodically at particular seasons, as spring and autumn, as a hygienic precaution. It is now rarely used. Local bloodletting by means of cupping or leeches is used in certain conditions, such as pleurisy, sciatica, inflammation resulting from injury to a joint, etc.

BLEEDING HEART YARD (once belonging to the Hattons). The name of a part of London where very poor houses predominate. Why so called is not known, but there is a tradition that here the devil cast the heart of one of the Ladies Hatton after he had torn it from her body. The place is mentioned by Dickens in *Little Dorrit*.

BLEEK, blāk, FRIEDRICH (1793-1859). A German biblical scholar. He was born at Ahrensbök, Holstein, July 4, 1793; educated at the University of Kiel (1812-14), and in Berlin, under de Wette, Neander, and Schleiermacher (1814-17). In 1818 he became tutor in theology in the University of Berlin. Soon afterwards he published essays on the *Origin and Composition of the Sibylline Oracles*, and on the *Authorship and Design of the Book of Daniel*, in which he attracted attention by solid learning, thorough investigation, and candor of judgment. In 1823 he became professor extraordinary; and in 1829 he accepted the chair of theology in the University of Bonn, where for thirty years he labored with constantly increasing success, due to the thoroughness of his investigations, the impartiality of his judgments, and the clearness of his methods of presentation. He died suddenly of apoplexy, Sunday, February 27, 1859, having given his regular lecture on the previous day. His defense of the genuineness of the Gospel of Saint John is regarded as one of the strongest that have yet appeared, and his critical labors on the New Testament are among the most important contributions to the maintenance of the evangelical faith that our time has produced. Translated are his *Introduction to the Old Testament* (London, 1869, 2 vols., reprinted 1875, 1 vol.), and his *Introduction to the New Testament* (Edinburgh, 1869, 2 vols.), and *Lectures on the Apocalypse* (London, 1875). His great work on the Epistle to the Hebrews (1828-40, 3 vols.) is untranslated. The Introductions just mentioned were published by his son from his notes

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(Berlin, 1860 and 1862, respectively); later so edited by Wellhausen (last ed. 1893) and Mangold (latest ed. 1886) as to make him the channel of views he certainly did not stand for while he lived.

BLEEK, WILHELM HEINRICH IMMANUEL (1827-1875). A German philologist, son of the preceding. He was born in Berlin, was educated in Bonn and Berlin, and in 1855 went with Bishop Colenso to Natal. The next year he settled in Cape Town as curator of the important library of the Governor, Sir George Grey. He was distinguished for researches in the languages of Africa. His works, written chiefly in English, include *The Languages of Mozambique* (1856); the uncompleted *Comparative Grammar of South African Languages* (1862-69); and *Reynard the Fox in South Africa* (1864).

BLEFUS'CU. The name of an island representing France in Swift's satire, *Gulliver's Travels.*

BLEIBTREU, blīp'troi, GEORG (1828-92). A German painter. He was born at Xanten, and studied at the Düsseldorf Academy, and under Theodor Hildebrandt. He first became known through the picture entitled "Destruction of the Kiel Turner-Corps at Flensburg" (1852), which was followed by paintings descriptive of episodes of the War of Liberation, the battles of Frederick the Great, and, later, of the Prussian-Austrian campaign and the Franco-German War. In 1858 he settled in Berlin, and in 1866 accompanied the Prussian Army in the suite of Prince Frederick Charles. During the campaign of 1870 he was attached to the suite of the Crown Prince. His works have fine detail and broad conception. The following are a few of his best productions: "Battle of Grossbeeren" (1857); "Episode from Battle of Waterloo" (1858); "Battle of Königgrätz" (National Gallery, Berlin); "Surrender of Napoleon After Sedan"; "Attack of Saxon Corps at Saint Privat" (1880).

BLEIBTREU, KARL (1859—). A well-known German poet and critic, born in Berlin. He studied at the University of Berlin and in London, and was editor, between 1884 and 1890, of various periodicals, including the *Magazin für die Litteratur des In- und Auslandes.* In 1890 he assisted in founding the Deutsche Bühne at Berlin. He is prominent in the literary movement sometimes known as 'Young Germany.' In addition to several collections of verse, such as the *Lyrisches Tagebuch* (2d ed. 1885), *Lieder aus Tirol* (1885), and *Kosmische Lieder* (1890), he has written some indifferent dramas, a number of works on fiction, and a *Geschichte der englischen Litteratur* (2 vols., 1887), in which he exalts his hero, Byron, at the expense of other names prominent in English letters.

BLEICHRÖDER'S, blīk'rē-dĕrz. The banking house in Berlin established by Samuel Bleichröder (died in 1855) in 1803, and continued by his son, Gerson Bleichröder (1822-93), under whose management it has become one of the most important private banking institutions in Europe. The house of Bleichröder dates its larger influence from its numerous transactions carried on with the Rothschilds and the patronage of Bismarck. Its financial relations with the Prussian Government began with the large subscriptions by Gerson Bleichröder to the building of the Prussian railroads. Financial advice and assistance were also sought from Bleichröder by the King of Prussia in 1866, and again in 1871, when the treaty of peace concluding the Franco-Prussian War was negotiated at the headquarters of the German Army at Versailles. In recognition of his services, Gerson Bleichröder was elevated to the hereditary nobility in 1872. The banking business was subsequently conducted by his sons, Hans and Georg Bleichröder.

BLEMYES, blĕm'ī-ēz, or BLEMMYES (Gk. Βλέμυες, Βλέμμυες). An ancient African people living in and around the Libyan Desert. In the Second Century, while Egypt was under Roman rule, they made predatory incursions into that province, and Diocletian made important concessions to them. They were powerful and troublesome as late as the Seventh Century, and old authors tell strange stories of their savage appearance and habits. It is supposed that the Ababdeh, the Bisharin, and other tribes are their descendants.

BLENCK, blĕnk, EMIL (1832—). A German statistician. He was born in Magdeburg, and studied law and cameralistics in Berlin. In 1869 he became a member of the Royal Bureau of Statistics, and in 1883 director of that institution. The course reorganized by him, and designed for the education of the higher Government officials employed in the departments of statistics, has produced excellent results. Since 1882 Blenck has been the editor of all publications issued by the Prussian Department of Statistics. His independent writings include the following: *Das königliche Statistische Bureau in Berlin beim Eintritte in sein neuntes Jahrzehnt* (1885); and *Das königliche Statistische Bureau während der Jahre 1885-96* (1898).

BLENDE (Ger., from *blenden,* to blind, delude; see below), or SPHALERITE. A zinc sulphide that crystallizes in the isometric system, and is usually found containing sulphide of iron, which gives it a dark color, in consequence of which it is familiarly known among the Cornish miners as 'black-jack.' It occurs both massive and crystallized, and in color is black or brown, and sometimes red, yellow, or green. It is found in the Harz Mountains, in Saxony, in Cornwall, England, and with lead ores in various localities in Missouri, Wisconsin, Iowa, and Illinois, in the United States. It is a valuable ore of zinc, and when pure contains 67 per cent. of that metal. The sulphur which it contains has been used for the manufacture of sulphuric acid. The name was given to it by German miners because, while it resembled the mineral galena, it yielded no lead.

BLÉNEAU, blā'nō' (*Blanoilus, Blanellus,* of the Middle Ages). A village of France, situated in the Department of Yonne, about 29 miles west-southwest of Auxerre. It is celebrated as the scene of a two-days' battle between the Prince de Condé and Turenne (April 6-7, 1652). The first day Condé gained an advantage over Turenne's army in the latter's absence, but during the night Turenne arrived, and the next day he overwhelmed the Spanish troops of Condé.

BLENHEIM, blĕn'ĭm (Ger. *Blindheim*). A village of Bavaria, 23 miles north-northwest of Augsburg (Map: Bavaria, B 4). It is memorable in connection with the great victory won by Marlborough and Prince Eugene over the French and Bavarians under Tallard, Marsin, and the Elector

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of Bavaria, August 13, 1704. The battle, however, did not actually take place here, but at a village in the vicinity called Höchstädt, about a mile north of the Danube, and is known to the Germans by that name. The French had massed their forces on their right and left wings, thinking the centre sufficiently protected by a narrow stream in front. Marlborough perceived the weak point in their line, and ordering an assault on the enemy's wings, to hide his real purpose, he with the mass of his army forded the stream, broke the French centre, took them in flank, and utterly destroyed the hostile army. Of 56,000 French and Bavarians, 14,000 were taken prisoners and 25,000 perished by the sword or in the Danube. The loss of the victors amounted to about 5000 killed and 8000 wounded. Near Blenheim the French defeated the Austrians, June 19, 1800.

BLENHEIM DOG, or MARLBOROUGH DOG. See SPANIEL.

BLENHEIM HOUSE. The seat of the Duke of Marlborough, erected near Oxford at the public expense in the reign of Queen Anne as a testimony of gratitude to the victor of Blenheim (q.v.). For this purpose £500,000 was voted, but that sum did not suffice for the completion of the work. The royal estate of Woodstock, in which it stands, was granted at the same time. The building was designed by Sir John Van Brugh, and is a grand monument,picturesque, in a heavy way. The length of the principal front from wing to wing is 348 feet, with advancing wings and a projecting perron brought together with insweeping curved lines toward the centre. The interior is proportionately magnificent, and the collection of paintings is one of the most valuable in Great Britain. In the grounds are a triumphal arch, and a column 130 feet high, surmounted by a statue of Marlborough. An inscription on the pedestal, written by Bolingbroke, recites the public services of the hero. The Manor of Blenheim Park embraces a circuit of about 12 miles.

BLENKER, blĕnk'ẽr, LOUIS (1812-63). A German-American soldier, born in Worms, Germany. He was one of the leaders of the German Revolutionary party of 1848, and as commander of the Freischaren (Free Corps), took Ludwigshafen (May 10, 1846), occupied the city of Worms, and made an unsuccessful attack on Landau. When the Prussian troops entered the Palatinate, he fought in several of the engagements in Baden, but after the suppression of the revolution was compelled to flee to Switzerland, whence he emigrated to the United States. Upon the outbreak of the Civil War he organized the Eighth Regiment, New York Volunteers, of which he became colonel. For his gallantry in the first battle of Bull Run he was raised to the rank of brigadier-general of volunteers. In 1862 he commanded a division in Western Virginia, and took an active part in the battle of Cedar Keys; but soon afterwards was superseded by General Sigel. He was mustered out of service March 31, 1863, and died in October of injuries sustained while with his command at Warrenton, Va.

BLEN'NERHAS'SETT, HARMAN (1764-1831). A wealthy British emigrant to America, accidentally conspicuous through his connection with the conspiracy of Aaron Burr (q.v.) He was born in Hampshire, England; was educated for the law at Trinity College, Dublin; married his niece, Adeline Agnew, then only 18 years of age, in 1796; and, in consequence of the social ostracism he thus brought upon himself, broke the entail upon the extensive Blennerhassett estates and emigrated to America in 1797. In the following year he bought the island later known by his name, in the Ohio, a few miles below Parkersburg, W. Va., where he built a large mansion, and amid luxurious surroundings dispensed a generous hospitality. A man of scholarly tastes, he spent much of his time in study and in the making of original experiments in the natural sciences. He was visited by Burr in 1805, and was by him involved in the ambitious schemes which, within the next two years, brought about their ruin. For his complicity in these schemes he was twice arrested, but was free from criminal prosecution after Burr's acquittal at Richmond. A large part of his extensive property, however, passed to his creditors. He was thereafter engaged as a cotton-planter, with little success, near Port Gibson, Miss.; removed to Montreal in 1819; practiced law there until 1822, when he returned to Ireland; and, after a few uneventful and unsuccessful years, died on the island of Guernsey, February 1, 1831. His wife was a woman of considerable literary talent, and published *The Deserted Isle* (1822), and *The Widow of the Rock, and Other Poems* (1824). She returned to America in 1842 and presented a claim to Congress for a reimbursement of her husband's losses at Blennerhassett Island, butshe died in New York before final action could be taken. Consult: Safford, *Life of Harman Blennerhassett* (Cincinnati, 1853), and also Safford (editor), *The Blennerhassett Papers, Embodying the Private Journal of Harman Blennerhassett* (New York, 1864). An article, "The True Story of Harman Blennerhassett," by Therese Blennerhassett-Adams, in Vol. LXII. of the *Century Magazine* (New York, 1901), gives for the first time, on the authority of family papers, the real cause of Blennerhassett's emigration to America, together with some details concerning the Blennerhassett family.

BLEN'NORRHŒ'A (Gk. βλέννα, *blenna*, thick mucous discharge + ῥοία, *rhoia*, a flow, flux). A term applied to an unusually copious discharge from any mucous membrane. The term is now but seldom used. In discharges called blennorrhœai, a mixture of epithelial scales is shed in large quantities from the mucous membrane (mucous cells), and occasionally pus-cells. In blennorrhœa of the lachrymal sac, or what is called 'watery eye,' if the inner corner of the eye be pressed by the fingers, an opaque, milky fluid will appear between the lids, instead of the transparent tears which are present when the lachrymal apparatus is in health. After inflammation of the genito-urinary mucous membrane, a gleety discharge frequently occurs, and continues for a long period. The treatment consists in establishing a robust state of health by tonics, fresh air, and careful regimen, with astringent lotions applied directly to the mucous membrane, to lessen the secretion, and occasional caustic stimulants, as the nitrate of silver, to alter the condition of the secreting membrane. See GONORRHŒA.

BLENNY (Lat. *blennius, blendius*, Gk. βλέννος, *blennos*, from βλέννα, *blenna*, slime, mucus). A representative of a genus (Blennius) of spiny-

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rayed fishes, remarkable for the abundance of slimy matter with which their skin is covered. Many are scaleless. The body is generally of an elongated form. They have only one dorsal fin, which, however, in many is deeply divided. They are distributed in the seas of all parts of the world. The true blennies are small fishes living in small shoals, frequenting rocky coasts, and often found in pools left dry by the tide, or even among the wet seaweeds, where they are capable of subsisting for a much longer time than that of the absence of the tide. They possess the power of using their ventral fins to aid them in moving about among rocks and seaweeds. They are hardly edible, but are much in request for the aquarium on account of their tenacity of life and their activity. They feed chiefly on small crustaceans. Many of the Blennidæ family retain their eggs within the oviduct until they are hatched, so that the young are produced alive and capable of seeking their own food. See Plate of GOBIES, BLENNIES, ETC.

BLEPH'ARI'TIS (from Gk. βλέφαρον, *blepharon*, eyelid). A chronic inflammation of the margins of the eyelids. It is very common, particularly in children, and occurs in persons who are debilitated, with poor hygienic surroundings or uncleanly habits. It is also a result of insufficient sleep, or may follow measles, chronic conjunctivitis, or exposure to dust, smoke, or wind. Very frequently it shows the presence of errors of refraction, requiring correction by eyeglasses. The superficial form is characterized by redness, itching, soreness, and swelling of the margins of the lids, with a formation of white scales between the lashes, which are loose. There is sensitiveness to light. If ulceration occurs, the lashes are glued together by yellowish crusts, which cover the ulcers. As in the other form, the lashes fall out, but in cases with ulceration they are not replaced. Ectropion (q.v.) or trichiasis (q.v.) may follow. The affection is chronic and very obstinate, but will usually yield to treatment.

BLEPH'AROPLAST' (Gk. βλέφαρον, *blepharon*, eyelid + πλαστός, *plastos*, formed, molded; referring to the cilia; see below). In plants, a name given by Webber to certain bodies occurring in connection with the formation of the male cells of one of the Cycads (*Zamia*). Homologous structures have been found in other Cycads (*Cycas*, etc.), in the Maiden-hair Tree (*Ginkgo*), and in various fern-plants. In the Cycads two blepharoplasts appear at opposite poles of the nucleus of the cell that is to produce the two male cells, and when it divides, each male cell receives a single blepharoplast. In all cases the function of the blepharoplast is the formation of cilia, by means of which the male cells may swim. Originally spherical in form, it becomes drawn out into a narrow band, which disposes itself in a spiral against the inner surface of the wall of the male cell, and from which cilia are developed which pierce the wall. The radiations which surround the blepharoplasts, and their position at opposite poles of the nucleus, have suggested that they are concerned in the formation of the spindle which precedes cell-division, but more evidence is needed before this view can be accepted. Many believe that the blepharoplast, while only a transient structure, is a genuine Centrosome (q.v.), while others contend that it is a unique organ of the cell. Homologous bodies have been described under the names 'Höcker,' 'Körnchen,' 'Nebenkern,' 'attraction sphere,' 'directive sphere,' and 'centrosome-like body.'

BLÉRÉ, blâ'rā'. A town in the Department of Indre-et-Loire, France, situated on the left bank of the Cher, about 15 miles east-south-east of Tours (Map: France, G 4). Bléré is the entrepôt for most of the traffic on the Cher, and is noted for a handsome Sixteenth-Century chapel. Population, in 1896, 3269. The famous castle of Chenonceaux (q.v.) is 4 miles distant.

BLES, blĕs, HENRI (c.1480-1550). A notable Flemish painter, about whose life and works very little is known. He is supposed to have been born near Dinant, and to have traveled in Italy. The "Adoration of the Magi," in Dresden, is his only signed picture; but paintings are accredited to him in nearly all the galleries of Europe. His brush was prolific, and there is great variety in his subjects. With Joachim Patinet he is by some considered a founder of the Dutch school of landscape.

BLESBOK, blĕs'bŏk. A harte-beest (*Alcephalus albifrons*), "of a beautiful violet color." See HARTE-BEEST.

BLESSING OF JACOB, THE. A painting by Rembrandt (1656) in the Museum at Cassel, Germany. It is a fine conception, and a masterly delineation of the biblical account of the blessing bestowed by Jacob on Ephraim and Manasseh.

BLES'SINGTON, MARGUERITE, Countess of (1789-1849). An English leader of society and author. She was born September 1, 1789, at Knockbrit, near Clonmel, Tipperary, Ireland, where her father, Edmund Power, was settled. At the age of 15 she was married to Captain Farmer, and shortly after his death to Charles John Gardiner, Earl of Blessington. With him she took several extensive journeys on the Continent, where, as well as in London, she gathered around her all the most distinguished men of the time. In Genoa she formed an intellectual friendship with Lord Byron, and afterwards resided in Paris until the death of her husband, in 1829. He left her a good fortune, which enabled her to gratify her literary tastes. She held a little court of her own at her family mansion, Gore House, Kensington, a suburb in the West End of London. Her celebrated soirées were frequented by many of her distinguished contemporaries. Her subsequent connection with Count d'Orsay placed her in an equivocal position as regards society, and consequently, on the accession to power of Louis Napoleon, with whom both were intimate, they left England for France. She died in Paris, June 4, 1849. Besides editing *The Keepsake* for ten years and doing other miscellaneous literary work, she wrote several novels and sketches of life and scenes in France and in Italy. Her most valuable production is the *Conversations with Lord Byron* (1834), which helped to place the poet in a more favorable light before his countrymen. Consult Madden, *Life of the Countess of Blessington* (3 vols., London, 1855).

BLES'SON, JOHANN LUDWIG URBAN (1790-1861). A Prussian military writer, born in Berlin. He entered the Pioneer Corps in 1813, served in the War of Liberation as an officer of engineers, was for some time a teacher in the mili-

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tary school in Berlin, and retired in 1829 with the rank of major. He wrote a number of important military works, including *Beitrag zur Geschichte des Festungskrieges in Frankreich 1815* (Berlin, 1818); *Uebersicht der Belagerungskunst* (1827); and *Uebersicht der Befestigungskunst* (Berlin, 2 parts, 1827-34).

BLICHER, blīk'ĕr, STEEN STEENSEN (1782-1848). A Danish lyric poet and novelist, born at Vium, October 11, 1782. He translated *Ossian*, and followed this with poems and novels of little importance till he began to cultivate the field of Jutland peasant stories and legends (1826), in which he excelled among Danish writers, and ranks very high in the world's literature. He was a close and sensitive observer of the comedy and tragedy of the commonplace sphere in which his pastor's life was passed, and rendered his observations with sympathetic art and rare love of nature. He died at Spentrup, March 26, 1848. "The Snow Bells" and "Birds of Passage" are his best later poems. *The Knitting-Room*, a collection of poems and stories largely in Jutland dialect, is characteristic of his simple naïve humor. His collected tales (*Jydske Romanzer*, *Nationalnoveller*, etc.) appeared 1833-36 and 1882. The collection *Gamle og nye Noveller* (Copenhagen, 1861-62) contains a humorous autobiography. Blicher's *Poems* appeared in two volumes (1835-36), supplemented by two others (1870). Consult Kristensen and Lund, *Blicher's Liv og Gjerning* (Copenhagen, 1882).

BLIDA, blē-dä'. A town of Algeria, 30 miles southwest of Algiers (Map: Africa, E 1). It is beautifully situated on the borders of the fine plain of Metidja, at the base of the Atlas Mountains. The town is fortified with ramparts and towers. These fortifications command the passes of the Atlas, and serve as a starting-point and base of supplies for all expeditions going south. The streets are of modern appearance, and there are numerous mosques, churches, arcades, barracks, a military hospital, and a railway depot. The Oued-el-Kebir, through an aqueduct, yields an abundant water-supply. The exports consist of oranges, grain, cotton, tobacco, raisins, etc. Cedar and cork trees abound in the vicinity, and copper and lead mines are worked. In 1825 and in 1867 Blida was almost destroyed by earthquakes. Population, in 1891, 11,404; in 1896, 13,026.

BLI'FIL, CAPTAIN JOHN. The name of a character in Fielding's *Tom Jones*, probably the original of Sheridan's Joseph Surface.

BLIGH, blī, WILLIAM (1754-1817). An English admiral, celebrated in connection with the mutiny of the *Bounty*. He was born, according to his statement, at Tyntan, Saint Tudy, Cornwall, 1753. It is probable, however, that he was the son of John Bligh, of Tretawne, and born at Plymouth, September 9, 1754. He entered the navy, and as sailing-master accompanied Captain Cook on his second voyage around the world. At Otaheite the bread-fruit tree was discovered, and on December 23, 1787, 'Bread-Fruit Bligh,' as he had been nicknamed, was appointed commander of the *Bounty*, with orders to sail to Otaheite or Tahiti, collect bread-fruit tree-plants, and transport them for introduction to the West India Colonies. On the way from Tahiti to Jamaica, a part of the crew mutinied, and forced the captain and eighteen men into the ship's launch, which they cast adrift, turning their own course back to Tahiti. The captain and his companions, who had very little provisions, and no sextant or map, arrived, after three months of severe hardship, at the island of Timor, a distance of 3600 nautical miles from the point where they were abandoned. To Bligh's skill and courage is due the fact that not a single life was lost. On Bligh's arrival in England, a man-of-war, under Captain Edwards, was sent, at his instance, to capture the mutineers. Some of them were seized; the rest had escaped to Pitcairn's Island (q.v.), with Fletcher Christian, the leader of the mutiny, accompanied by a number of Tahitian men and women. Their place of refuge, however, was not discovered until 1808, when an American ship accidentally touched at the island. At that time drunkenness and unbridled passion had left only one of the mutineers, John Adams, remaining, who had succeeded in instilling morals and religion in the little community there. Their fortunes form the subject of a poem by Byron, entitled *The Island of Christian and His Comrades*. Bligh was again sent out to collect bread-fruit trees and convey them to the West Indies, in which he was successful. In 1794, during the French Revolutionary War, Bligh commanded a ship of the line; but again exciting the disaffection of his men by his harshness, they mutinied and ran the ship into a French harbor. In 1797 he commanded the *Director* at Camperdown, when Admiral Duncan defeated the Dutch Admiral De Winter; the same year he distinguished himself by his fearlessness at the mutiny at the Nore. In 1801, as commander of the *Glatton* at Copenhagen, he was personally thanked by Nelson. In 1808 Bligh was appointed Governor of New South Wales; but in his prohibition of the unlimited importation of ardent spirits his conduct was so tyrannical that the military officer of the colony summarily arrested and kept him imprisoned for over two years. The officer, Major Johnson, was subsequently cashiered. Bligh, on returning to England, was made rear-admiral in 1811, and vice-admiral in 1814. He died December 7, 1817. For narrative, consult Bligh, *The Mutiny of the Bounty*, (Philadelphia, 1790).

BLIGHIA, blī'ī-ä. See AKEE.

BLIGHT, blīt (perhaps akin to *bleak*, pale, wan). A name applied to diseases of a number of plants, and to the parasites which cause them. The term has been very vaguely and variously used, having in fact been applied to almost every disease of plants caused by the condition of the atmosphere, or of the soil, the attacks of insects, parasitic fungi, etc. As now used by botanists, the term 'blight' is limited to attacks of parasitic fungi and bacteria. Among the numerous plants subject to blight are the apple, pear, strawberry, tomato, potato, and grape (qq.v.).

BLIGHT, AMERICAN. See AMERICAN BLIGHT.

BLIGHTBIRD. A small insect-eating bird (*Zosterops cœrulescens*) of New Zealand, so called because it frees fruit-trees of blighting insects. See WHITE-EYE.

BLIM'BER, CORNELIA. A character in Dickens's novel *Dombey and Son*, assistant in Dr. Blimber's (her father's) school, and afterwards the wife of Mr. Feeder, B.A., the usher.

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BLIMBER, Doctor. The master of a private school at Brighton, to which Paul Dombey was sent, in Dickens's *Dombey and Son.* "A portly gentleman in a suit of black, with strings at his knees and stockings below them. He had a bald head, highly polished; a deep voice, and a chin so very double that it was a wonder how he managed to shave into the creases."

BLIND, Education of the. In every generation of children, a certain proportion, varying according to social conditions and climatic influences, are born blind, or with such defective organs of sight as to become blind. With the improvements in cleanliness and in sanitary appliances at orphan asylums and houses of refuge, blindness has decreased in the United States in recent years. Most of the blind are born of the poor, and even the few who are not so born tend to sink into the dependent class. Hence, in all civilized countries, blindness and pauperism have been synonymous terms, although many of its victims are endowed with keen sensibilities, and suffer more from their low social position than from their physical infirmity. The Nineteenth Century saw a wonderful revolution in the condition of the blind. They have emerged from a state of utter ignorance, dependence, and general wretchedness; and while many have become well-educated, independent, self-supporting citizens, the condition of all has been greatly improved. For this radical change, much credit is due to the blind themselves, for the eagerness with which they have taken advantage of the opportunities offered them, and for the brave and successful struggle to overcome the obstacles in their path. Since their infirmity cuts them off less than the deaf from social intercourse with the world at large, they are, as a rule, more cheerful and happy than the latter, while a tendency to conceit is doubtless attributable to the consciousness that they have had to contend with very great difficulties.

History of Institutions. The first book calling attention to the condition of the blind was published in Italy in 1646, and we find, from this time onward, an increasing interest in the subject of blindness and its effect on the human mind. Locke, Leibnitz, Condillac, Reid, and Diderot wrote upon it, and Rousseau endeavored to bring the question out of the region of abstract speculation into that of practical everyday life. Raised print had been long, though dimly, foreshadowed, and a number of blind persons had received assistance in their studies from tangible apparatus, such as raised letters and ciphering-tablets, before Valentine Haüy began his work. To him, however, belongs the honor of inventing embossed books for the blind, as well as of founding in Paris, in 1785, the first school for their instruction. The Royal Academy made a report on his work in that year, and while pointing out the features which his system had in common with the agencies previously employed by individual blind persons, declared that to him alone were due their perfection, extension, and systematization. The school for the blind aroused great interest in Paris, and Louis XVI. took Haüy into favor, bestowing several offices upon him. In the dark days of the Revolution, Haüy and his school suffered much; but he continued his work, under great difficulties and privations, educating some pupils who became famous. Haüy's long, faithful, arduous, and fruitful labors in behalf of the sightless earned him the title of 'Father and Apostle of the Blind.' He published an essay on their education, and continued his work in Russia and Prussia, after he had been obliged to give it up in Paris.

England followed the lead of France by establishing in 1791 the School for the Indigent Blind in Liverpool, the object of which was to teach poor blind children to work at trades, to sing in church, and to play the organ. In 1793 Mr. David Miller, a blind man, and Rev. Dr. David Johnston founded the Royal Blind Asylum and School in Edinburgh, the main purpose of which was to train them to habits of manual labor, though in later years the directors have devoted increased attention to the intellectual development of the pupils. The Bristol Asylum for the Blind was opened in 1793, its object being to teach sightless children such handicrafts as would enable them to earn their own living. They also receive instruction in music and the English branches. The School for the Indigent Blind in London was established in 1799. Its chief object was instruction in manual labor, but a more liberal scheme of education was adopted after a time. Similar establishments were founded in Norwich, Glasgow, York, Manchester, and elsewhere. The organized efforts made in Great Britain for the relief of the blind were founded upon the idea that as a class the blind must necessarily remain at the foot of the social scale, forever dependent upon the more fortunate classes. Hence most of the British schools have never taken a high stand in their literary or musical training. The Royal Normal College and Academy of Music for the Blind was established in London, 1872, by an American, Mr. F. J. Campbell, a blind man, who had been educated and had taught at institutions for the blind in the United States, and who brought American teachers and methods to England. There are also in Great Britain societies for teaching the adult blind to read, and circulating libraries of books in raised type have been established in London, Brighton, and many provincial towns. The Association for Promoting the General Welfare of the Blind, which has been in operation for fifty years, supplies regular work to many at their own homes, and finds employment for others in its workshops.

In most of the European institutions the prevailing idea is that what is done for the blind is in the spirit of favor and charity, rather than of right and obligation. A large number of the so-called schools, especially those in Great Britain, are mere asylums, chiefly supported by annual contributions, which are made and received in the nature of alms. Even in those establishments which are endowed and supported by the governments the pupils are brought up under such influences as favor the segregation of the blind into a class by themselves, and do not inspire the desire for usefulness and self-maintenance.

At the beginning of the Nineteenth Century institutions for the blind, mainly fashioned after the model set by Haüy, were established in various parts of Europe. The Vienna Institution was founded in 1804, Dr. Klein, a blind man, being its director for about fifty years. That of Berlin was established under the superintendence

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of Herr Zeune in 1806, Haüy having paved the way for it on his way to Russia. In 1808 three institutions were established — one in Amsterdam by an association of Freemasons, one in Prague by a charitable society, and one in Dresden. In 1809 Haüy put the school in Saint Petersburg in operation, and Dr. Hirzel organized that of Zürich. In 1811 the Society of the Chain, an organization similar to the Freemasons, started an institution in Copenhagen, and many others were founded soon afterwards. All the principal countries of Europe have special institutions for the instruction of the blind in the rudiments of learning, in music, and in mechanical arts. There are more than 150 of these on the Continent, many being under Government supervision or control.

In the United States of America the education of the blind rests on a different basis. As soon as their claims to a share of the benefit of common-school learning were urged, it was conceded not as a matter of charity, but as a matter of right. The most valuable distinctive feature of the American institutions is that they constitute an integral part of the educational system of the country. The right of the blind to participate in all the educational benefits provided for every child in the Commonwealth is acknowledged by the State in its sovereign capacity, and since they cannot be taught in the common schools, an express provision is made for their instruction. This policy has acted very favorably upon the blind, and has inspired them with self-respect and a worthy ambition to be independent.

The general system adopted in the American schools is as follows: (1) to give to all pupils the same sort of instruction, and to the same degree, as is given in the best public common schools; (2) to teach them the elements of vocal and instrumental music; (3) to train them in some sort of simple handicraft by which to earn a livelihood. Owing, however, to the prevailing desire of the young in America to strike out in new directions, to the general preference for brain-work rather than hand-work, and to the disadvantage at which the blind do mechanical work, comparatively few, hardly two-tenths, it is said, practice for a living the handicrafts which they have learned at the several institutions. Most of the graduates resort to various branches of the musical profession, teaching the elements of vocal and instrumental music, playing upon organs, tuning pianos, or trading in musical instruments. Some graduates take petty agencies, and with a guide go about the country peddling on their own account. Others, favored by friends, find employment in some of the establishments where hand-work combined with a certain amount of head-work is required. A few work diligently at their trade, and earn an honest and comfortable livelihood. The general condition of the graduates is affected by the prevailing feeling of compassion, which, it must be said, is often abused by the blind. Upon the whole, however, the general effort made to lift the blind out of the pauper class has had very satisfactory results. There is doubtless a greater proportion of really self-supporting blind persons in the United States than in any other country. This is owing mainly to the public institutions for their education and training, especially to the pioneer school, the Perkins Institution, on which the others are modeled to a great extent, and to its director for forty-five years, Dr. Samuel Gridley Howe. Dr. Howe, the Haüy of America, possessed not only the humanity and inventive genius characteristic of the famous Frenchman, but also great executive ability.

The first school for the blind in the New World was founded in Boston, Mass., chiefly through the efforts of Dr. John D. Fisher, a young physician, who had visited the French school. It was incorporated by Act of Legislature March 2, 1829, as the New England Asylum for the Blind. The State granted its aid from the beginning, this being proportioned at first to the number of beneficiaries received and educated, and active work was commenced in 1831, when Howe was engaged as director. Exhibitions of the pupils were given before the Legislature at an early date, and much interest and enthusiasm were aroused. Col. Thomas H. Perkins gave his mansion in Pearl Street to the institution, which was renamed in his honor, as the Perkins Institution and Massachusetts Asylum (now School) for the Blind. The other New England States promptly took measures to secure for their blind children the advantages of instruction; but instead of erecting institutions at home, they sent their beneficiaries to the Massachusetts school.

Instruction in the literary department included not only the simple branches of a common-school education, but also some higher mathematics, astronomy, and natural philosophy. The study of languages, too, was introduced at an early date; but, of course, the main emphasis was laid on a solid English education. In addition to vocal music and instruction upon the piano and organ, the foundation for an orchestra was immediately commenced. The tuning of pianofortes, taught as a practical employment, has proved to be a lucrative one. The pianos of the public schools of Boston have been tuned and kept in repair by the blind for the past twenty-five years. Physical training, both in the gymnasium and out of doors, has always been insisted upon, and the pupils are gently stimulated to run about and play like other children. The Perkins Institution soon surpassed the European institutions, and has long been the best school of its kind in the world. A printing-press was started at an early date, and many improvements in the apparatus for the education of the blind were made. A detachment of pupils visited various parts of the country, and they were exhibited before the legislatures and people of twelve different States for the purpose of inducing them to make provision for similarly afflicted persons within their own limits. These exhibitions were so effective that "provision for the education of the blind was made in those States before the representatives of the people had time to wipe the tears from their eyes."

In 1837 Dr. Howe began the education of Laura Dewey Bridgman, a child seven years old, who had become blind, deaf, and dumb from scarlet fever at the age of two. It had been supposed up to that time that a person in Laura's condition could not be taught the use of language; and Dr. Howe's success elicited great interest, his reports detailing the progress of his pupil being translated into several European languages. His methods, which remain the standard ones, may be thus briefly stated: Upon

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articles in common use, such as spoons, forks, and keys, labels were pasted, containing their names printed in raised letters. Laura felt of these carefully, and soon distinguished the difference between the crooked lines—spoon and key. Then small detached labels containing the same names were given to her, and the child, observing their similarity, laid these on the articles thus designated. The same process was repeated with all the articles she could handle. After a time the labels were cut up into their component letters and these were arranged side by side. They were then mixed in a heap, and a sign was made to her to arrange them herself. The meaning of these exercises now dawned upon her mind, and the important step was taken. Laura's education was continued until she was twenty. She learned to converse fluently in the manual alphabet, to read easily, and to write well and correctly. She studied arithmetic, algebra, geography, history, and elementary physiology. She was an expert needlewoman, could sew on the sewing-machine, and knit fine lace. With Oliver Caswell and other blind deaf-mutes, Dr. Howe began first with the manual alphabet, instead of with printed labels. The Perkins Institution has maintained as a specialty the teaching of blind deaf-mutes, Helen Keller having begun her education under the direction of this school.

The separation of the sexes was early insisted upon by Dr. Howe, on the ground that while marriage between defectives is always unfortunate, it is especially so in the case of a class so helpless as the blind. In 1868-69 the cottage or family system was introduced, the State of Massachusetts appropriating nearly $100,000 for cottages for the girls.

The Kindergarten for the Blind, an offshoot of the parent institution, was founded in 1887 by Michael Anagnos, the son-in-law and successor of Dr. Howe, who has continued the policy of the latter, and has greatly enlarged the work of the institution. An opportunity is thus afforded for a continuous education from the earliest stage to the gates of the college, where it is thought more desirable to have the blind mingle with the seeing than to remain segregated as a class apart.

The work of educating the adult blind in their own homes was begun in Massachusetts in 1900, the Legislature appropriating a sum of money to be expended by the Perkins Institution in this way. Several teachers were employed, and the enterprise proved so successful that the State increased its appropriation the following year. Instruction is given in reading and in several branches of handicraft, suited to the sex and the physical condition of each person. The institution places at the disposal of these outdoor pupils, free of all charge, its large library of books in embossed type of four different kinds. In this manner an attempt is made to solve the problem of educating, cheering, and rendering in a measure self-supporting and independent those who become blind after the period of childhood and youth has passed.

The first thought and purpose of building up special institutions for the instruction of the blind seem to have occurred to benevolent persons in New England, New York, and Pennsylvania almost simultaneously, but without concert. The New York Institution for the Blind was incorporated April 22, 1831, through the efforts of Dr. Samuel Akerly and Mr. Samuel Wood. On March 15, 1832, Dr. John D. Russ began the education of three pupils, and although he resigned his position in 1836, he continued to manifest much interest in the improvement of educational appliances for the blind.

The progress of the school was for some years retarded by the want of an efficient head to direct its affairs. In 1845 Mr. James F. Chamberlain was elected superintendent, and the institution entered upon an era of prosperity and advancement which has continued to this day. The excellent Pennsylvania Institution, which has grown to be among the foremost of the world, was founded in Philadelphia by the Society of Friends in 1833. Robert Vaux had for some years urged the necessity of making such a provision for the education of the blind. Julius R. Friedlander, the first principal, had had experience in European institutions for the blind, and came to Philadelphia in the hope of establishing a school for their benefit. He organized the school with great care and deliberation, gave exhibitions of the attainments of his pupils before the legislatures of Pennsylvania, Delaware, and New Jersey, and obtained appropriations for the support of beneficiaries from each of these States, and later from Maryland. The Ohio School for the Blind was established at Columbus in 1837. The Virginia school opened at Richmond in 1838, and that of Kentucky at Louisville in 1842. In 1900 there were 37 institutions in the United States, with 393 instructors and 3665 pupils, of whom 417 were in kindergartens, 1738 received instruction in vocal music, 1797 in instrumental music, and 1924 were in the industrial departments. The libraries contained 100,000 volumes. The value of buildings and grounds was $6,500,000, and the annual expenditure was over $1,000,000.

In Europe, Mr. Anthony Buckle, superintendent of the Yorkshire school, who died in 1900, did much for the elevation of the blind in the industrial and moral scale, as well as for their intellectual and spiritual enlightenment. The *Ecole Braille*, situated at Saint Mandé, one of the suburbs of Paris, is administered with vigor and efficiency by Monsieur A. Péphau. It is under the control of the municipal authorities and entirely supported by the city. The *Institution Nationale* of Paris, the school founded by Haüy, is liberally supported by the State, and its pupils, selected from a large number of applicants residing in all the districts of France, are, as a rule, superior in intelligence to those of other European and of American schools. The institutions for the blind of Germany do not differ from those of France in any of the fundamental principles upon which the work is conducted. They employ a class of instructors superior to those of any other country. Few of the teachers are blind, and most of them are graduates of the German universities. The Imperial institution for the blind in Vienna now occupies a fine building, situated near the Prater, and well calculated to meet all demands for the physical, mental, moral, and spiritual development of its inmates. In addition to a commodious and well-equipped gymnasium, excellent school and music rooms, and a printing-office with the necessary tools and machinery, it contains a museum, which is the best of its kind in Europe, in arrangement, classi-

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fication, and proper display of its contents. It is not so rich in collections of specimens of apparatus as that of Paris. The director, Prof. Alexander Mell, is the author of the *Encyklopädisches Handbuch des Blindenwesens*—an important work on the blind and the methods and appliances employed in their instruction and training.

An international congress for the amelioration of the condition of the blind was held in Paris in connection with the Universal Exposition of 1900. Germany, England, Denmark, Sweden, Holland, Russia, Hungary, Switzerland, Italy, Portugal, the United States, Belgium, and France were represented, the two countries last named having the largest number of delegates and the controlling influence. There is an American Association of Instructors of the Blind, which meets biennially.

BOOKS. In all the branches of instruction for the blind, while oral teaching is of no small importance, aid is derived from the use of books and apparatus adapted to the sense of touch. The process of printing embossed books consists of pressing the type strongly on heavy paper, in such a way as to produce letters in relief.

The first characters adopted by Haüy in 1785 were those of the Illyrian or Slavonic alphabet, doubtless on account of their square form. Large editions of a few works were printed at great expense in his system, which gave 365 letters on 50 square inches of surface. About forty years later James Gall, a printer and publisher of Edinburgh, took up the work, being deeply impressed with the importance of putting the Bible into the hands of the blind. He printed his first book in 1827, and in 1834 published the Gospel of Saint John, the first book of the Scriptures ever printed for the blind. In 1838 he printed for the British and Foreign Bible Society the Gospel of Luke and the Acts of the Apostles. His labors extended over a period of twelve years. While at first he was obliged to contend with apathy and incredulity, much interest was eventually excited in his work in Great Britain and elsewhere. He used a modified Roman letter, choosing the lower-case alphabet in preference to capitals, whose uniformity renders them difficult to distinguish by the touch. His system gave 526 letters on 50 square inches. Meantime Dr. Howe, when beginning the work of educating the blind at the Perkins Institution, found himself seriously hampered by the fact that at that time (1832) only three embossed books in English were in existence. By dint of various improvements, such as stereotyping, using thin paper expressly prepared, and reducing the size of the letters, he succeeded in cutting down the bulk of the books one-half, and the expense of printing to one-quarter of what it had been. Thus the Boston method gave 702 letters to 50 square inches, 21 editions of books being printed in a short time. A further improvement gave 1067 letters to the same space. Dr. Howe was extremely desirous of giving the Bible to the blind, and in 1836 the entire New Testament was printed at the Perkins Institution. Numerous textbooks were also issued.

The first printing in Philadelphia (in 1833-34) gave only 290 letters to 50 square inches, and was abandoned. In 1836-37 work was resumed with an improved method giving 826 letters. John Alston was the inventor of the Glasgow system which gave 891 letters, using capital letters, however, as did the Philadelphia type. He printed the Gospel of Saint Mark in 1837, the New Testament in 1838, and the whole Bible in 1840, Dr. Howe finishing his task of issuing the Bible in 1843. Alston's type was too small to be legible, and his system did not stand the test of time. Mr. Lucas, of the Bristol Institution, invented a system of stenographic printing, with arbitrary characters and many contractions, by which he secured largeness of type and diminished the size of the book. In 1839 a society was formed to aid Lucas in printing the Bible and teaching the blind to read on his system. As this system was phonetic, it did not teach correct spelling, which is in any event difficult for the blind to master. Mr. Frere, of London, also invented a phonetic system about 1838, as well as return lines. His books are read from left to right and from right to left alternately, the letters being reversed in alternate lines.

Nearly all of the supposed improvements for facility in reading were made upon the idea that, as the majority of the blind are adults, all methods must be directed for their benefit—a theory which does not recommend itself to Americans, who consider the education of the young as of the first importance. Of these new methods only two have any prominence at the present time: Dr. Moon's complex line type and the arbitrary point character. The former uses a combination of Roman letters with arbitrary characters, reversing the lines like Frere, but not the letters. His system is read with facility owing chiefly to its large type, measuring one-fourth of an inch. It was meant for elderly blind persons and for those whose hands are roughened by manual labor. It is well adapted for these two classes, but is too unwieldy for general use. The 64 volumes of the Moon Bible can be printed in eight volumes in Roman type. It also has the disadvantage of being illegible to seeing persons. Dr. Moon has printed many books in English and in foreign languages. A society has been formed to extend his system, and the blind are taught by it in their own homes. It requires, however, special teachers.

The arbitrary point character was invented by Charles Barbier, a Frenchman, and arranged in its present form by Louis Braille, one of the blind professors at the Institution Nationale of Paris. It consists of six dots. One or more of these are placed in various positions, making 62 varieties of form. One great advantage of this character is that it can be used by the blind for writing to others in their condition. Another is that it affords an excellent method for writing and printing music. It is extensively used, and is a valuable invention. Mr. William B. Wait, the superintendent of the New York Institution for the Blind, arranged a modification of the point system, the dots of his method being placed horizontally. The friends of the point system would be glad to abolish the Roman letter altogether, whereas the advocates of the latter are glad to avail themselves of both methods, which are taught side by side in some institutions. They point out that seeing persons use three distinct methods for their educational purposes: Roman letter for reading, script letter for writing, and an arbitrary arrangement of characters for music. There would therefore seem to be no reason why the blind should not employ two:

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Roman letter for reading and the point for writing and music.

Since the time of Haüy thoughtful educators have dwelt on the importance of using seeing methods as far as possible for the instruction of the blind. The point is to rescue the sightless from segregation as a class apart, and to give them as many interests as possible in common with the rest of the world. Thus, owing to the influence of Mr. Gall, the modified Roman letter was adopted by the Royal Society of Arts. In 1851 the Royal Commissioners of the Exhibition of the Works of Industry of All Nations, held in London, recommended the universal adoption of Dr. Howe's books (the Boston type). In 1872 the American Association of Instructors of the Blind passed a series of resolutions in favor of the adoption as far as practicable of seeing methods. In 1876 the London School Board, after a patient and careful examination of the arguments advanced by some of the ablest educators of the blind in England, decided to adopt the methods used by seeing children in ordinary schools. In the reports of the Perkins Institution, Dr. Howe urged constantly the minimizing in every possible way the difference between the blind and the seeing. Dr. Frank Rainey, of the Texas Institution, read before the World's Congress of the Educators of the Blind, held in Chicago in 1893, an able paper on this subject. He said, among other things: "If we use the ordinary methods, the child will think and talk like seeing persons, whereas if we use odd or extraordinary methods, it will not have the same conceptions of concrete things as we do."

A great advantage of the Roman letter over the point is that blind children can get their early training from teachers in the public school, or from their parents, under the former system, and they themselves can in turn, after they have grown up, teach seeing children, making fairly good governesses for families. The punctuation of the point system is complicated, and the omission or abrasion of one single point alters the entire letter. "Any system where frequent substitution of its characters is necessary for its perfection is essentially weak in all its parts, and is fearfully defective in that its structure depends upon position, reversion, and substitution."

The principal printing establishments in the United States are: (1) The American Printing House for the Blind at Louisville, Ky. Congress has since 1879 appropriated $10,000 a year in support of this enterprise, the publications being distributed *pro rata* among the institutions of this country. (2) The Howe Memorial Press at the Perkins Institution, Boston, which has an endowment fund of nearly $150,000, raised by private subscription.

The first circulating library for the blind in the United States was established at the Perkins Institution in 1882, although books had been lent to the blind free of charge before this time. Philadelphia and New York also have libraries of this sort, and departments for the blind have been instituted in the State Library of New York at Albany, and in several of the principal cities of New England.

APPARATUS. Among the early appliances for writing may be mentioned the 'string alphabet' invented by Messrs. Milne and Bain, of the Edinburgh Asylum. It consisted of knots tied upon cord. Gall's writing-stamps, which date from 1838, were much used. Saint Clair and Gall invented processes for guiding the pencil in an ingenious but slow and tedious way. Güldberg, of Copenhagen, also invented a method of pencil-writing. The modern methods employed in the best American institutions are (1) the ordinary typewriter and (2) tablets for point-writing, according to the Braille and kindred systems. This has the great advantage of being legible by the blind themselves, but is a slow process. It is gradually replaced in advanced work by the Hall-Braille writer—an adaptation of the principles of the typewriter to the printing of point characters, made by Mr. Frank H. Hall, of the Illinois Institution for the Blind. The followers of the New York point system use a similar machine called the kaleidograph, the invention of Mr. Wait, of the New York Institution. A third process consists in writing with a pencil on a grooved sheet of cardboard or aluminium, thus forming a square handwriting. This method has the advantage of extreme simplicity and cheapness, and has been much used by the blind for many years.

For *arithmetic*, W. H. Taylor, of York, England, invented an octagonal ciphering-board, with cells into which type may be placed in different positions to represent the digits. A modification of this board was made at the Perkins Institution and manufactured by one of its graduates.

For the study of *natural history*, relief representations of animals are employed, also stuffed specimens of birds and animals. Papier-maché models, life-size, assist the blind in the study of anatomy, while for botany these are greatly enlarged.

The early *maps* for the blind were made in Europe, on boards and by hand, the process being tedious and expensive. Dr. Howe, in 1836, invented an atlas which is thought to have been the first book of maps for the blind ever made. At the present time the blind are aided in their study of geography by wooden wall-maps in relief; dissected maps, also of wood, made at the American Printing House for the Blind, Louisville, Ky., and at the Perkins Institution in Boston; and embossed maps printed on paper by the British and Foreign Blind Association, London, and by Mr. Kunz, Illzach, Alsace.

All the *kindergarten* occupations, except drawing and painting or color work, are used with the blind children. In the kindergarten at Jamaica Plain, Mass., the following changes have been made in the ordinary appliances, to fit them for the use of the blind: The tables are marked out in inch squares by grooves instead of by lines. For the use of the gift representing surface, line, and point, frames 2 inches high and the length and breadth of the kindergarten tables have been prepared. These frames are stuffed with horsehair, and covered with cloth stitched in inch squares with coarse silk. The cushions thus formed are placed on the tables, and the tablet rings and half rings (having been previously drilled, two holes in each) are pinned on to the cushions. Sticks large enough to have holes drilled in them are used in place of the regular kindergarten sticks, and beads one-quarter inch in diameter are used to represent the point. By pinning the forms they make to these cushions, the children are able to examine their work with their fingers without displacing it, and can thus

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'see' what they have accomplished. In the use of the parquetry, the circles, squares, etc., are not pasted on plain paper, as is usual in the kindergarten, but square and oblong cards of different sizes with raised lines, forming inch squares, printed on them have been substituted.

BIBLIOGRAPHY. Anagnos, *Education of the Blind: Historical Sketch of Its Origin, Rise, and Progress* (Boston, 1882); Haüy, *Essai sur l'éducation des aveugles* (Paris, 1786); Nieboquet, *Des aveugles et de leur éducation* (Paris, 1837); St. Marie, *Der Blinde und seine Bildung* (Leipzig, 1868); Armitage, *The Education and Employment of the Blind* (London, 1871); Moon, *Light for the Blind* (London, 1873); Rösner, *Unterricht der Blinden* (Essen, 1877); Mell, *Encyklopädisches Handbuch des Blindenwesens* (Vienna, 1899-1900). Consult also the *Blindenfreund* (published at Düren since 1881) and *Le Valentin Haüy* (edited by Maurice de la Sizeranne).

BLIND, blint, KARL (1826—). A German agitator and writer. He was born at Mannheim, and while a student at Heidelberg was imprisoned for his revolutionary activity. In 1848 he participated in the uprising in Baden, and had to flee, wounded. The next year he joined the band of liberals headed by Struve which invaded southern Germany. He was taken prisoner and sentenced to eight years' confinement. He was, however, set free by the populace and went to Karlsrühe, whence he was sent by the Provisional Government as an envoy to Paris. Expelled from France, he went to Brussels, and then (1852) to London, where he found rest. There, for many years, he kept up his political agitation through articles in many journals, and in intercourse with Garibaldi, Mazzini, Louis Blanc, and other democratic leaders; but after 1866 his writings became less revolutionary in tone, in consequence, perhaps, of the death of his stepson, who in May of that year attempted to assassinate Bismarck, and committed suicide in prison. Blind published a great number of political essays and brief articles on history, mythology, and German literature. Among his works are: *Fire-Burial Among Our German Forefathers: A Record of the Poetry and History of Teutonic Cremations; Ygdrasil: or, The Teutonic Tree of Existence;* and biographies of Freiligrath, Ledru Rollin, and Francis Deák. In 1897 he contributed an autobiographical sketch to the *Cornhill Magazine*, London.

BLINDAGE (from *blind*, in the sense of invisible, making invisible, as in 'blind story'). A screen to shelter troops from an enemy's fire. It may be constructed of lumber and earth, or of trees inclined against walls, or toward each other; much will depend on the available materials and ingenuity of construction. The effective defense of Ladysmith, Kimberley, and Mafeking, in the Boer War of 1899-1902, was rendered largely possible by the clever construction and use of improvised bombproofs and shelters. See FORTIFICATION.

BLIND BEGGAR OF AL'EXAN'DRIA, THE. See CHAPMAN, GEORGE.

BLIND BEGGAR'S DAUGHTER OF BETHNAL GREEN. An English ballad in two parts, of the time of Queen Elizabeth. The blind beggar has a fair daughter, Bessie, whom a knight falls in love with, and marries. At the wedding-feast the blind beggar turns out to be Henry, son of Sir Simon de Montfort. Day, in 1659, and Knowles, in 1834, produced dramas entitled *The Blind Beggar of Bethnal Green*, founded on this poem.

BLIND FISHES (OF CAVES). See CAVE-ANIMALS.

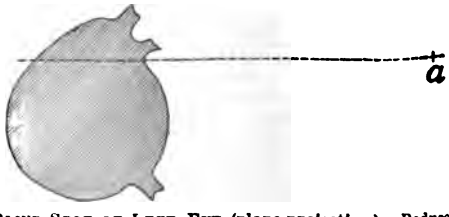
BLINDNESS. Want of sight may arise from any cause within the eye intercepting the rays of light on their way to the optic nerve, or from disease, defect, or injury of the optic nerve or optic tracts, or of the visual centres in the brain. Blindness may exist from birth, or be acquired. It may be present during the day or the night, and may be permanent or transient, complete or partial. *Congenital Blindness* is due to deficient development of the nervous apparatus or to defect in the globe; to cataract (q.v.); to defect or disease of the cornea, choroid coat, optic nerve, or retina; or to tumors. *Acquired Blindness* may be due to injury of the eye or wounds of the head, or operations, or sympathetic irritation; to ophthalmia neonatorum, trachoma, diseases of the cornea, iris, choroid, or retina; to glaucoma or tumors; or to Bright's disease of the kidneys, heart disease, syphilis, disease of the brain or its meninges, or of the spinal cord; certain fevers; poisoning by lead, alcohol, or tobacco, etc. See AMAUROSIS; AMBLYOPIA; ASTHENOPIA; HEMERALOPIA; NICTALOPIA; EYE, DISEASES OF THE; and COLOR-BLINDNESS.

BLIND PREACHER, THE. The Rev. William Henry Milburn, for many years the Chaplain of the United States Senate.

BLIND SHELL. See PROJECTILE.

BLIND SPOT. A roundish oval spot in each retina, which is blind. It corresponds to the place of entry of the optic nerve. The spot is some 1.8 millimeters in width, i.e. subtends an angle of some 6° (the limits given by Helmholtz are 18° 55′ and 12° 25′). That it is totally blind, whether to brightness or color, was first proved by the French physicist Mariotte in 1668, and is easily demonstrable. Its form differs somewhat in different eyes. With careful observation, it can be shown to possess certain irregular prolongations, which represent the course of the large blood-vessels that enter the eye along with the nerve.

A striking experiment may be performed as follows: Close or bandage the right eye, and with the left gaze steadily at a point upon a



BLIND SPOT OF LEFT EYE (plane-projection). Reduced from a large diagram, in which the distance from the inner edge of the point of fixation a, to the inner edge of the blind spot was 54.5 cm. The distance of the point of fixation from the eye in the experiment was 2.2 m.

wall or screen some 7 feet distant. Let another person seat himself directly before the wall, on your left-hand side, in such a position that his forehead is on a level with the point of gaze, and his nearer cheek some 50 centimeters distant

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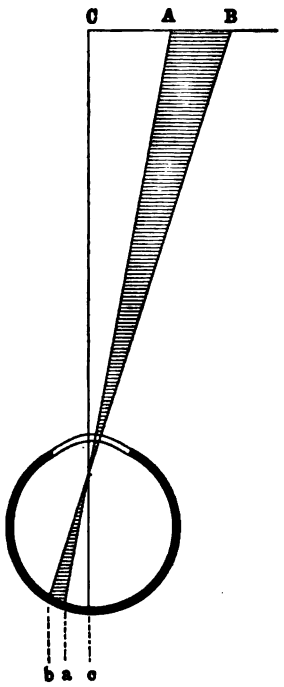
from it. If your gaze remains constant, his face will entirely disappear, and the wall will seem to extend continuously away from you on the left. By spreading a sheet of paper on the wall, and noting the points at which a colored pencil, moved to and fro by an experimenter, disappears and reappears, you can make an accurate map of the blind spot, including the vascular prolongations mentioned above.

This experiment raises a difficulty. You fail to see the face, and yet you see something, i.e. the unbroken color of the wall. The blind spot is thus filled out with color sensation. Now in binocular vision this result might have been expected. For the optic nerve enters the eyes on the nasal side of each retina; so that when we are using the two eyes together for purposes of visual perception, superposing (as it were) the one upon the other, and laying temporal half over nasal and nasal over temporal, the area that is blind in the one eye will correspond to an area in the other that is endowed with normal vision; the two eyes supplement each other. Further, the result would not be surprising, if it were gained in monocular vision, but under the ordinary conditions of seeing; for the eye is intrinsically a moving organ, and we instinctively turn the spot of clearest vision (see EYE) upon any object in the visual field that we wish to observe. But what of the result, in monocular vision, when we have taken especial pains to restrain the eyeball from movement?



PROJECTION OF BLIND SPOT OF RIGHT EYE.

Cc, optic axis; *ba*, area of optic nerve; *AB*, area of blind spot as projected on the screen *CAB*.

Let us look at the experimental data: (1) There seems to be no doubt that the spatial value of the blind spot, in visual perception, is entirely normal; points seen on the inner and outer edges of the spot do not approximate or run together, as they would if the spot were wholly indifferent for purposes of space-perception. Paste nine large letters, in three vertical columns of three letters each, upon a sheet of paper. Hold the paper at such a distance and in such a position before the eye that the central letter of the square falls within the blind spot, while the surrounding eight letters are still visible. You will find that the surrounding letters still form a square for perception; whereas, if the blind spot had no spatial function, the two letters to right and left of the central would approach each other, and the whole figure would take on an hour-glass form. (2) If the surface at which we are looking is uniformly colored, the blind spot is filled out by this color. This law was demonstrated by our first experiment. It may also be proved as follows: Paste on a sheet of paper a colored ring, large enough to contain the blind spot within it. Let the ring be so wide that the spot slightly overlaps its inner edge. You see a solid disk, of the color of the ring. (3) If the surface is checkered or variously colored, there is (for practiced observers) no filling of the spot. Paste upon a sheet of paper a rectangular cross, the two vertical arms of red and the two horizontal of blue, with the four arms mitred at the centre. Hold the paper in such a way that the centre, with its two red and two blue triangles, falls at the centre of the blind spot. At first you will think that you see the two red or the two blue arms as a continuous band of red or blue; with practice, you will be able to convince yourself that at the central point of the figure you really see nothing.

The last of these three facts is intelligible enough: if the spot is blind, it stands to reason that one does not see with it. The first two facts, however, require explanation. We may (1) attempt a peripheral theory of the phenomena; that is to say, we may assume that the retinal sensations set up in the near neighborhood of the blind spot somehow 'irradiate' over the spot itself. The irradiation can hardly be thought of as physical, an irradiation of the stimulus. We must rather suppose that the local signs attaching to retinal points along the edge of the spot are extensible signs, carrying with them the sense-values and space-values of the whole blind area. When one is required to localize a pressure upon the skin of the back, one may make a mistake of as much as 5 centimeters in any direction; the local sign is extended so far in all directions. The local signs of the particular ring of retinal tissue under consideration would be similarly extended, only that the direction of their extension (toward the centre of the spot) is limited by the structure and function of the rest of the retina. If this explanation appear far-fetched, we may have recourse (2) to a central theory; that is to say, we may assume that the blind spot is filled out by 'association' or 'imagination,' by centrally aroused sensations (see SENSATION), while the periphery is and remains blind. There is no inherent difficulty in this view, and it accords well with the fact that the unpracticed observer sees the spot as filled, while the more practiced observer is aware that he does not see with it at all. We must then suppose that the local signs of the rim of the spot have taken shape under the same general laws that have conditioned visual local signs at large; and we may, perhaps,

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suspect that their development has been influenced, in each eye, by the normal space-values of the corresponding area of the other eye.

BIBLIOGRAPHY. H. von Helmholtz, *Physiologische Optik* (Hamburg, 1896); Titchener, *Experimental Psychology* (New York, 1901); Wundt, *Physiologische Psychologie* (Leipzig, 1893).

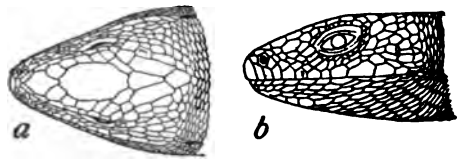
BLINDSTORY. A story or other architectural horizontal division in a building, either outside or inside, which is without windows or other openings of importance. On the outside, it may consist of a blank wall or of a series of blind arcades. On the inside of churches the term is applied especially to the middle story of the nave above the side-aisles and below the clerestory (q.v.), or windowed story, of which it is the opposite in architectural terminology. It is then interchangeable with *triforium* (q.v.); and is in the form of a wide, open gallery in Byzantine, Lombard, Norman, and other Romanesque schools. In Gothic this gallery is gradually reduced until it becomes a series of false arcades.

BLIND TOM (c.1850—). A musical prodigy, a blind and almost idiotic negro, born of slave parents near Columbus, Ga., and called Thomas Bethune after his master. His musical genius attracted wide attention, and from 1861 he was frequently exhibited in New York. He was able, after a single hearing, to render even complicated music on the piano, frequently playing two melodies simultaneously. After playing, he often sprang up and applauded himself vociferously. He was difficult to manage, and his growing mental infirmity caused his final withdrawal, since which he is said to have lived in obscurity in New York.

BLINDWORM (Dan. *blindorm;* so called on account of the small size of the eyes), or BLIND SNAKE. A name given to certain worm-shaped, burrowing reptiles and amphibians. It applies especially to those of three groups, none of which is really blind:

(1) The serpent-like lizards of the family Anguidæ, of which the common blindworm, orvet, or slow-worm (*Anguis fragilis*) of Europe and western Asia is a type. Both the body and tail are elongated and serpent-like, and rarely more than one foot long; it possesses no external traces of appendages, but has internally a rudimentary shoulder-girdle, sternum, and pelvis, placing it intermediate between the lizards, which have four legs, and the snakes, in which all traces of limbs are lost; indeed, it has been proposed to put several snake-like lizards, with more or less degenerate legs, together with some of their allies, into one group and call them serpent-lizards (Saurophida). The eyes are bright, but small, giving rise to the belief that the animal is blind. It feeds on slugs and insects, and is perfectly harmless. It is so very timid that when startled its muscles contract violently, and the body is rendered so stiff and brittle that it is easily broken. Blindworms bring forth their young alive, and winter together in numbers under brush and leaves, or in loose, dry soil. Several genera of the same family, and presenting similar characteristics, inhabit the warmer parts of America, some of which have part or all of their limbs externally developed; the beautiful green, brown-banded, many-keeled lizard (*Garrhonotus multicarinatus*) of California is an example.

Best known, however, is the 'glass-snake,' frequently found in the loose soil of dry fields from Illinois to Florida, and westward into Mexico. It has no feet, but by serpentine movements is able to move with considerable swiftness; and when overtaken can hardly be captured without injury, for its tail is so loosely articulated and so free of muscles that it breaks off like a bit of glass, to be quickly renewed by a new growth if the animal is not further harmed. It is yellowish-green above, with black lines. "The snout is long and pointed, the ear-pits large, the eyelids well developed, and each flank is provided with



"GLASS-SNAKE" LIZARD.
a, top of head: *b*, side of head.

what is ordinarily a deep groove, but which, on the animal's swallowing some large object, appears as a tract of elastic skin, the rigid skin of the body generally being incapable of expansion." It is perfectly harmless. Its technical name is *Ophisaurus ventralis*. Consult Cope, *Crocodilians, Lizards, and Snakes* (Smithsonian Institution, Washington, 1900).

(2) A family of true serpents (Typhlopidæ), called 'blind snakes,' because their eyes in all cases are minute and weak, and in some are almost invisible under overlapping plates. They rank lowest among serpents, are only a few inches in length, and have rigid bodies suitable for burrowing, shaped much like those of earthworms, and with curved tails. They occur in all the warmer parts of the world, boring their way through the loose top-soil and feeding on worms, grubs, and insects; and in India sometimes appear in large numbers above ground after showers, inspiring the natives with foolish dread, for they are quite harmless. Numerous genera and species inhabit the warmer parts of America. Consult Gosse, *A Naturalist's Sojourn in Jamaica* (London, 1851).

(3) The Cæciliidæ, a family of degenerate urodelous amphibians for a long time classed among reptiles. The body is vermiform and without limbs, all traces even of the pelvic and pectoral girdles having been lost. The ribs are too short to encircle the body, and the vertebræ are articulated as in fishes and lower amphibia, and not as in snakes. There are small scales in the skin, the eyes are very small, and in some species are covered entirely by the skin. There is neither tympanic membrane nor tympanic cavity. The small mouth lies on the ventral side of the conical head, and there is no tail, for the vent opens at the posterior end of the body. All these departures from the typical amphibian type are adaptive, fitting the cæcilians for their subterranean burrowing life. The young are hatched with external gills, and gill-slits, and for a time lead an aquatic life. The cæcilians inhabit warm countries and feed on earthworms and insect-larvæ; they are most abundant in South America, and Mexico and Ceylon possess several species. Sometimes they are called blindworms, but these am-

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phibia should not be confused with the lizards and snakes above mentioned.

BLISS, Cornelius Newton (1833—). An American merchant and politician, born in Fall River, Mass. He was a clerk in New Orleans, and subsequently in Boston, and in 1866 was admitted a partner in the commission business of J. S. & E. Wright & Co., of the latter city. In 1881 his firm was merged into that of Bliss, Fabyan & Co., of New York. He was chairman of the Republican State committees of New York of 1887 and 1888, and treasurer of the Republican National committees of 1892, 1896, and 1900. In 1897-98 he was Secretary of the Interior in President McKinley's Cabinet.

BLISS, Edwin Munsell (1848—). An American Presbyterian theologian, born in Erzerum, Turkey, a son of Isaac G. Bliss, formerly agent of the American Bible Society for the Levant. He was educated at Robert College, Constantinople (1862), and afterwards at Amherst and Yale. His extensive travels through Persia and Turkey, and his close association with foreign missions, have given him an intimate acquaintance with Eastern conditions, of which he writes in his books, *Encyclopedia of Missions* (1891); *The Turk in Armenia, Crete, and Greece* (1896); and *Concise History of Missions* (1897).

BLISS, Frederick Jones (1859—). An American archæologist, born at Mount Lebanon, Syria. He graduated at Amherst College (1880), and at the Union Theological Seminary, New York (1887), but was not ordained to the ministry. After independently conducting researches in Syria, he was in 1890 associated as explorer with the Palestine Exploration Fund. He held this office until 1900, during which time he superintended the excavations at Tell-el-Hesy, on the site of Lachish (1891-93), and at Jerusalem (1894-97). During the course of these excavations he discovered the site of a city. His excavations at four places in Palestine, between 1890 and 1900, revealed much concerning pre-Christian pottery. His published works include *A Mound of Many Cities* and *Excavations at Jerusalem* (1894-97).

BLISS, Philip Paul (1838-76). An American singer and composer. He was born at Clearfield, Pa., and studied at the Geneseo Normal Academy of Music, Geneseo, N. Y. In 1874 he became an evangelistic speaker and singer. In 1864-76 he composed a number of hymns, for which he generally wrote the words, and which had a very great popularity. These include: "Hallelujah! 'Tis Done!" "Pull for the Shore," and "Hold the Fort." He perished in the Ashtabula (O.) railway disaster.

BLISS, Porter Cornelius (1838-85). An American journalist. He was born in Erie County, N. Y., and was the son of the Rev. Asher Bliss, a missionary to the Indians. He investigated the condition of the Indian tribes in Maine, New Brunswick, and Nova Scotia, in 1860-61, and in 1861 went to Brazil as private secretary to Gen. J. W. Webb. In 1863 he explored the tract called the Gran Chaco for the Argentine Government, and in 1866 became secretary to Hon. C. A. Washburne, United States Minister to Paraguay, whom he assisted in collecting material for a *History of Paraguay*, 2 vols. (1871). At the outbreak of the war between Paraguay and Brazil, he was arrested by President Lopez as a Brazilian spy. He was released in 1868, however, on the demand of the United States Government, and afterwards was a translator in the War Department, Washington; edited the Washington *Chronicle* (1869-70); and was secretary of legation in Mexico (1870-74). In 1879 he was the New York *Herald's* correspondent in South America.

BLISS, William Dwight Porter (1856—). An American Episcopalian clergyman. He was born in Constantinople, Turkey, and was educated at Robert College, Constantinople, Phillips Academy, Andover, Mass.; Amherst College (1878), and Hartford Theological Seminary (1882). He organized the first Christian Socialist Society in the United States, in 1889, and he is president of the National Social Reform Union. He has been editor of *The Dawn* (1889-96), of the *American Fabian* (1895-96), and of the *Encyclopedia of Social Reform* (1898), and in 1901 was editor of the publications entitled *The Social Unity* and *The Civic Councilor*.

BLISS, William Julian Albert (1867—). An American physicist, born in Washington, D. C. He graduated at Harvard in 1888 (A.B.), and received a "proficient in electrical engineering" at Johns Hopkins in 1891. He was assistant in physics at Johns Hopkins from 1895 to 1898, and associate in physics there from 1898 to 1901, when he became collegiate professor of the same subject. His publications include a *Manual of Experiments in Physics*, in collaboration with Joseph S. Ames (1898).

BLISTER. A character in Fielding's *Old Man Taught Wisdom; or, The Virgin Unmasked.* He is in love with Lucy, and attempts to make himself agreeable by discussing his trade.

BLISTER-BEETLE. A dark-colored, elongated beetle of the family Meloidæ, so named because the dried and pulverized bodies of certain of them are used to make blister-plasters. They are also called oil-beetles (q.v.), because some species, as of Meloe, exude a disagreeable yellow fluid from the knee-joints when disturbed. In the adult stage these beetles occur on foliage and flowers, especially the goldenrod, and several kinds are destructive to the potato-plant. The food habits of the young are very different from those of the parent. These beetles illustrate a method of insect development termed hypermetamorphosis. (See Metamorphosis.) The best-known one is the cantharis, or Spanish-fly (*Lytta vesicatoria*), of southern Europe, which is bright green, and about an inch long. It is gathered from its food-plants—lilac, privet, etc.—at night, when at rest, by beating the bushes and catching the insects in a cloth, by persons who guard their faces against the acrid volatile discharges of the beetles with veils and gloves. They are killed usually by immersion in hot vinegar and water, and then dried and put into air-tight bottles. Several other species of blister-beetles are similarly used in other parts of the world.

The active principle of the blistering-flies is *cantharidine*, $C_{10}H_{12}O_4$, which possesses such powerful properties that one-hundredth of a grain placed on the lip rapidly causes the rise of small blisters. Administered internally, blistering-flies cause heat in the throat, stomach, intestines, respiratory organs, etc.; and if in large doses, they give rise to inflammation of a serious na-

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ture, and sufficient to cause death. Externally, they are employed as a blistering agent. There are various medicinal preparations of blistering-flies, such as *cerate of cantharides*, which contains 320 parts of cantharides to 180 parts yellow wax, 180 parts of resin, 220 parts of lard, and 150 parts of oil of turpentine; *tincture of cantharides*, procured by digesting blistering-flies in proof-spirit, etc.; but that most commonly employed is *plaster of cantharides*, or *blistering-plaster*, obtained by heating and straining 80 parts of cerate of cantharides, and melting 1000 parts of Burgundy pitch with the strained liquid. See BLISTERS; MELOIDÆ (for bibliography); and illustration on Colored Plate of BEETLES.

BLISTERS (akin to O. Dutch *bluyster*, blister; cf. *blast*, blow). Medicinal agents which, when applied to the skin, raise the cuticle into small vesicles filled with serous fluid. They are applied either in the form of plasters or in a fluid state, as suits the convenience of the person or part, and have for their object the establishing of a counter-irritation or diversion of morbific action from a part in which it cannot be reached by remedies, or from some organ where it may do permanent mischief, to some more superficial part of the body. The most common blister in use is made of cantharides (see BLISTER-BEETLE) mixed with a convenient proportion of lard and wax to form the blistering ointment of ordinary use. If applied too long it produces distressing affection of the urinary bladder, and may produce sores which are difficult to heal. Four hours are generally requisite to produce the desired effect. Mustard (*Sinapis nigra*) is frequently used, but seldom left on sufficiently long to produce blistering. Its effect may be limited by applying white of egg to the blistered surface. Croton-oil, strong liquor ammoniæ, tartar-emetic ointment, and many others, are used in practice. If the occasion for the blister passes off, the vesicles should be opened freely, and their fluid contents allowed to escape, the vesicated surface being then dressed with some cold cream or lard. But if it should appear desirable to promote a discharge from the skin, the raised cuticles may be snipped off, and the blister either applied again at intervals, or some stimulating ointment, as savine ointment, should be used. Blisters are especially useful in inflammations of serous membranes, as pleurisy, in glandular tumors, in indolent ulcers, and for the relief of muscular pain, as well as for old joint affections.

The term blisters is also commonly applied to elevations of the cuticle filled with serum or blood.

BLISTER-STEEL. See IRON AND STEEL.

BLITHE'DALE ROMANCE, THE. Hawthorne's novel on the Brook Farm experiment, which is regarded by Mr. Howells as in some respects the finest of the author's works.

BLIZZARD. A severe, blinding storm of fine dry snow, with a freezing wind. This word is popularly said to have originated in the United States, and is in fact on record there as early as 1830 or 1840; but more recent investigations have shown that it is used in analogous senses in the local dialect of Lancashire, England, where it can be traced back for several centuries and is usually spelled *bleasard*. It came to be widely employed in 1880-81 in connection with the severe storms in the Western States, and has been in almost universal use since the great storm of March, 1888, when snow fell to the depth of three feet over the Atlantic States and New England, and was drifted by gales of wind for several days into drifts of five, ten, and twenty feet deep, causing a general suspension of traffic. A similar storm occurred in eastern Virginia and Maryland in February, 1898, and one is also recorded for the neighborhood of Norfolk, Va., in the early part of the last century. The most destructive blizzards, because of the intense cold, occur in the region between Dakota and Missouri and Ohio. Similar storms of snow and wind are also frequent in Great Britain. These storms correspond very nearly to the *purga* of Siberia and the *buran* of Russia. They are due essentially to the rapid southward flow of a mass of cold air pushing outward from a large region of high barometric pressure. They have a well-defined front edge, which advances with great regularity, the rate of progress being by no means so rapid as that of the wind itself, whence we infer that the wind at the front must be rising upward and flowing over. The general rate of progress is therefore due, not to the wind as such, but to the differences of density and pressure prevailing in the atmosphere on either side of the front. On this account it has become possible for the officials of the United States Weather Bureau to forecast the advance of a blizzard with considerable accuracy, and very few cases occur in which the citizens are not abundantly forewarned.

BLIZZARD STATE, SOUTH DAKOTA. See STATES, POPULAR NAMES OF.

BLOAT (Icel. *blotna*, to become soft, *blautr*, soft, wet), HOVEN, or TYMPANITES. A condition in cattle or sheep, in which, owing to the formation of gas in the rumen, or first stomach, this organ becomes painfully distended. The trouble frequently occurs from eating too much green alfalfa, clover, or other legumes. Eating undue quantities of grain sometimes produces the same effect. Cases of bloat are most frequent among animals that are unaccustomed to grazing on green legumes. Relief may usually be attained in mild cases by administering liberal doses of cathartics. One pint of linseed-oil or a pound of Epsom salts would be a suitable dose for a cow and about one-fifth that amount for a sheep. If simple remedies fail, the breathing becomes distressed, and the animal stupid, the gas may with safety be allowed to escape by an external opening made with a canula and trochar, or with a large pocket or table knife, at a point intermediate between the last rib, the lumbar vertebræ, and the prominence of the haunch.

BLOCH, blôg, JEAN DE (1836-1902). A Polish financier, economist, and writer on military affairs. He was born at Radom, of Jewish parents. He was administrator, under Government appointment, of the entire railway system connecting the Black Sea and the Baltic, and holder of the concessions for numerous lines. He was active in promoting an industrial movement in Poland. This he furthered by his large interests in the lumber and sugar trades, of which he became the actual head. He was constantly engaged in scientific and philanthropic enterprises among the poorer classes. He first became known to the world at large, however, as a propagandist of universal peace, partly by his articles in

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French, German, and English periodicals and his war-and-peace museum at Lucerne, but more particularly through his great work published at Saint Petersburg in 1898 (7 vols.), and in abridged form translated into English by R. C. Long as *The Future of War in Its Technical, Economic, and Political Relations* (1899; in England as, *Is War Now Impossible?*). In this book the author argues that under modern conditions a war would necessarily be of such length as to result in the starvation of the contending powers, consequent revolution, and the destruction of the State; and hence that it is unlikely to be entered upon in the future.

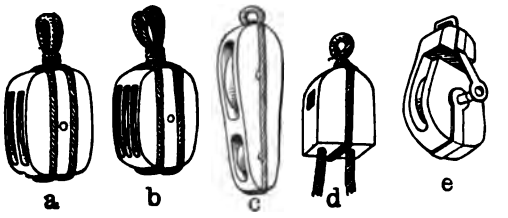
BLOCH, Karl Heinrich (1834-90). A Danish painter. He was born in Copenhagen, and studied at the Copenhagen Academy. From 1852 to 1865 he was in Italy, and in 1883 he was appointed a professor at the Copenhagen Academy. He first achieved a reputation for nature-studies, in particular those drawn from Jutland and Zealand, and for humorous pictures. His most important paintings, however, are historical. The list of his works includes: "Peasant's Cottage" (1858); "Roman Street Barber" (1864); "Christian II. in Prison at Sonderburg" (1871); "James of Scotland Visiting Tycho Brahe," and two large historical frescoes at the University of Copenhagen.

BLOCH, Marcus Elieser (1723-99). A German ichthyologist, born of poor Jewish parents in Anspach. He was permitted to grow up in ignorance, and at nineteen he had read nothing except a few useless rabbinical treatises. He then became an assistant to a Jewish surgeon in Hamburg, and learned German and Latin. He decided to study medicine, went to Berlin, and devoted himself with indefatigable zeal to anatomy and other branches of natural history. His great work is the *Allgemeine Naturgeschichte der Fische* (12 vols., Berlin, 1872-95, with 432 colored plates), long the most comprehensive work on ichthyology, and still valuable, especially for its pictures. His collection of fishes went to the Berlin Zoölogical Museum.

BLOCH, Moritz. A Hungarian philologist and theological writer. See Ballagi, Moritz.

BLOCHMANN, blôg'mân, Karl Justus (1786-1855). A German educator, born in Reichstädt (Saxony). He studied at the University of Leipzig, and from 1809 to 1816 was an instructor in Pestalozzi's school in Yverdon, Switzerland. In 1824 he opened in Dresden the Blochmann Institute, which in 1829 was united with the Vizthum Gymnasium, and long enjoyed a very considerable fame. His method was in general similar to that of Pestalozzi, except that it placed a greater emphasis upon the orthodoxy of the time. He wrote what is perhaps the best German biography of Pestalozzi: *Heinrich Pestalozzi, Züge aus dem Bilde seines Lebens und Wirkens* (1897).

BLOCK. An instrument used in practical mechanics, and especially on board ship, for changing the direction in which a rope leads, or for gaining power at the expense of speed. It consists of a framework, or shell; one or more pulleys, or sheaves; a hook, shackle, or other means of attachment to other objects; a pin or pivot-bolt for the sheaves to revolve upon; and, generally a strap of rope or iron to which the hook or shackle is attached. Blocks are classed in several ways according to the number of sheaves, as *single, double, treble, fourfold,* etc.; according to their design, as *snatch* blocks, *fiddle* blocks, *gin* blocks, *secret* blocks, *sister* blocks, *check* blocks, *clump* blocks, etc., and according to their use as *cat* blocks, *quarter* blocks, *clew-line* blocks, *topsail halliard* blocks, etc. The apparatus called a *tackle* or *purchase,* consists of two blocks and the rope (called the *fall*) which *reeves* (i.e. passes) through them. One end of the fall,



BLOCKS.
a—Double block. b—Treble block. c—Long-tackle block. d—Clew-line block. e—Snatch block.

called the *standing end,* is made fast to the *breech* (the part opposite the hook) of one of the blocks; from this the fall leads through the other block and then back through the first one; if the blocks are double, treble, fourfold, etc., the fall leads back and forth through the blocks until all the sheaves are filled. See Tackle.

BLOCK, blôk, Moritz. A French writer on statistics and political economy. He was born in Berlin, but was naturalized in France, where he served in the Ministry of Agriculture from 1844 to 1852, and then in the Bureau of Statistics till 1862, devoting himself henceforth exclusively to authorship. Among his numerous works on agriculture in various countries of Europe, on French statistics and finances, and on socialism in Germany, the most important are: *Des charges de l'agriculture dans les divers pays de l'Europe* (1850); *Dictionnaire de l'administration française* (1892), which won for him his great reputation; *Statistique de la France* (1875); *l'Europe politique et sociale* (1893); *Petit manuel d'économie pratique* (1890), which was translated into eleven languages; and *Les progrès de la science économique depuis Adam Smith* (1890). From 1856 he edited *L'Annuaire de l'économie politique et de la statistique,* and he also published several statistical works in German.

BLOCKADE (Fr. *bloquer,* to obstruct, block; *bloc,* block). The investment of an enemy's city, port, or seacoast. It may be military, in which case the object of the operation is to reduce the invested place, or commercial, for the purpose of shutting out neutral commerce from access to the blockaded port or coast.

The right to establish a blockade rests in the general right which every belligerent power possesses of distressing its enemy and weakening the power of resistance. (See Belligerent.) As such it imposes the obligation of observance upon a neutral, even though incidentally the neutral be injured by the cutting off of commercial relations. But the neutral need not employ preventive measures; nor is the breach of a blockade a municipal offense which the blockading power may require the neutral to punish. The responsibility of its maintenance belongs to the block-

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ading belligerent. As a sovereign act, also, the proclamation and establishment of a blockade rests with the highest authority of a State. At the commencement of a blockade a delay is usually granted by comity to permit neutral vessels in port to sail, which during the American Civil War was fixed at fifteen days. Neutral men-of-war on diplomatic errands and ships in distress are generally allowed entry. A neutral may insist that due notice of the blockade shall be given, and that the declaration be substantiated by a suitable force at the point affected.

The rules relating to blockades are a development of the past hundred years. In 1804 Prussia, in alliance with Napoleon, had seized Hanover and declared her ports closed to England. The latter retaliated by proclaiming the coast from the Elbe to Brest under blockade. Napoleon in 1806 issued the Berlin Decree, laying the whole British coast under blockade. England followed with the Orders in Council putting a blockade on the coast from the Elbe to Italy. These were mere 'paper blockades,' as neither power could actually cover the coasts with blockading squadrons; but they served to render any neutral liable to seizure who went from an English to a Continental port, or *vice versa*. The subsequent development of commerce and the recognition of neutral rights finally led to the Declaration of Paris in 1856, which requires that a "blockade, to be binding, must be effective." The United States was not a party to this convention, but during the Civil War was the first one practically to enforce its rules. The Crimean War, the American Civil War, and the war between the United States and Spain for the liberation of Cuba, furnish the best examples of modern blockades.

Three requirements are necessary to constitute valid capture for breach of blockade: (1) *Due Notification;* (2) *An Effective Blockade;* (3) *Breach of Blockade.* (1) Notice may be given in two ways: by diplomatic announcement to neutral powers and by a warning at the blockaded port usually inscribed upon the register of the ship seeking to enter. The French rule requires both. But the diplomatic notice, after a reasonable length of time, under modern conditions of communication, implies presumptive knowledge of the blockade on the part of all shipowners. In the Civil War, on April 19, 1861, the ports from South Carolina to Texas were proclaimed in a state of blockade, and a week later this was extended to Virginia. Since at first an effective force actually invested but a small portion of the coast, it was customary to give notice at the harbor-mouth as the ports were really closed. Thus it was little more than a paper blockade for some time. If the blockade is raised temporarily, as by the approach of an enemy's fleet or for any other cause, excepting storms, a new diplomatic notice is necessary. (2) The rule for an effective blockade was adopted to prevent the widespread inconveniences resulting from the so-called 'paper' or 'cabinet' blockade. The Declaration of Paris defines it as "maintained by a force sufficient really to prevent access to the coast of an enemy." It requires that the evasion be made a dangerous act. (3) *Breach of Blockade.*—To render a capture valid an actual attempt to break an effective blockade must appear. This may be evidenced by the ship's papers, her course, or the owner's instructions. The penalty for breach is confiscation of the ship and, unless proved innocent, the cargo also. But no punishment can be inflicted upon the crew. The doctrine of 'continuous voyages' requires that though a ship may touch at a neutral port, if her eventual destination is a blockaded one, she is liable. This rule is applied with caution.

When from peace or other causes the investment ceases, the blockade must be declared raised. See Snow, *Manual of International Law* (2d ed., Washington, 1898).

The maintenance of an effective naval blockade depends primarily upon the possession of great naval superiority by the blockading force. From the standpoint of grand strategy, the blockade of an enemy's coast is desirable if the enemy depends upon foreign countries for his munitions of war, or the materials of which they are made; or if the sea affords assistance to his land operations; or for the protection of the commerce of the nation establishing the blockade. A blockade *may* be desirable for the purpose of cutting off food-supplies and general imports; but its importance, based on those grounds, is frequently overestimated. For it must be understood that those countries which import a large part of their food do so because they can purchase it cheaper than they can produce it—not because the production is beyond their capacity. A blockade which would interrupt foreign supplies would stimulate domestic production and divert labor from the remunerative employments to that of agriculture. A country which depends upon the sea for its food likewise depends upon it as an outlet for its manufactures, and the financial disturbance caused by closing the foreign market to its exports is quite as likely to cause suffering and bring the nation to seek terms of peace as the threatened scarcity of food which an interval of a few months is likely to cure. The importance of maintaining a blockade depends largely upon the amount of trade interrupted. If a country has a land frontier, it is manifest that this must be controlled or the blockade will be annoying only and not vitally important. The seaport towns would suffer, but the country might continue to be but little affected.

The difficulty of maintaining a blockade is at present less than it has been at any time in the history of maritime war, notwithstanding the torpedo-boat — surface and submarine. The actual blockading force need be composed of light vessels only, in part of the large torpedo craft commonly called torpedo-boat destroyers. The heavier ships, especially at night, should lie farther out, beyond the easy range of torpedo-boat attack, but in supporting distance of the inner fleet should the enemy attempt a sortie in force. The maintenance of this condition depends upon the position of a base in the enemy's territory where coal and supplies may be taken on board, or where at least there may be found a safe anchorage and refuge for the smaller ships in case of very heavy weather. During the continuance of such weather the heavy ships can move farther in, replacing the lighter ones which have been compelled to leave station, so that the blockade is not broken.

The most perfect blockade of a long coast was that maintained by the United States Navy during the Civil War. The conditions were as

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favorable as ever can be expected. The South possessed a long land frontier, but except along the Mexican border it was dominated by the United States forces. The navy held several bases in the enemy's territory, and could have had others had it been deemed necessary. As the South had almost no seagoing naval force, many of the blockading ships were lightly armed merchantmen commissioned as auxiliaries. Blockading fleets will always be largely composed of such craft if the extent of blockaded coast is great, because no nation has a sufficient number of regularly built war-ships available for such duty, and for stopping merchant vessels they are quite as good as more powerfully armed and better protected ships. If the enemy still possesses seagoing fighting ships, they must be kept in port by an adequate force of fighting ships, or they may escape and raise the blockade of ports where the enveloping fleet is weak. One of the closest blockades ever maintained was that of Santiago by the fleet under Admiral Sampson during the Spanish War. Seven of the heaviest ships in the navy lay in a semicircle about the entrance to the harbor, about two thousand yards apart, and from four to six thousand from the entrance. In addition to these were several cruisers, auxiliary yachts, and torpedo-boats. At night, auxiliary cruisers and steam-launches patrolled the entrance, which was lighted up by search-lights of one of the battle-ships. Not even a skiff could have left the harbor unobserved.

The establishment of a blockade of the enemy's coast protects a country's commerce because it prevents, or tends to prevent, the fitting out of cruisers to prey upon it. But the war against commerce—what the French call the *guerre de course*—is becoming of less and less importance. The capture of merchant vessels has never affected the result of war, and the operations of 'commerce-destroyers' are likely to be attended with difficulties. It is no longer possible for them to keep the sea for long periods, as their radius of action is limited by their coal-supply. Furthermore, merchant vessels of belligerents are likely to be transferred to neutral flags if the insurance rates rise unduly through greatly increased danger of capture. And, lastly, the tendency of modern warfare is toward increased exemption of private property from capture.

A military blockade is designed to shut off an enemy from his source or base of supplies, make him ineffective, and eventually force him to surrender through lack of food, water, ammunition, or other supplies. It is not a regular siege, in the sense that organized efforts are made to take the base by assault; neither is it necessarily accompained by a regular bombardment, though it may be subject to such intermittently. The military blockade, from the point of international law, does not occupy so important a place as the naval operation.

BLOCK BOOKS. See PRINTING.

BLOCK COAL. A name given to certain non-coking bituminous coals of Ohio and Indiana, on account of the cube-like forms into which they break. See COAL.

BLOCKHOUSE. A temporary military fortification, usually made of logs banked with earth, and surrounded by a stockade. Its construction will depend largely on the service it is intended for, the country in which it is used, the troops occupying it, and the material available. Blockhouses were extensively used in the American Civil War of 1861-65; for instance, to protect the long line of communications of Sherman's Army in the Atlanta campaign. The Spaniards, during the closing years of their occupation of Cuba, adopted them extensively, notably along the line of the 'Trocha.' The vastness of the theatre of operations in the British-Boer War of 1899-1902, and the extreme mobility of the Boers, compelled the British to secure all cleared country by an extensive system of blockhouses, built at intervals of from 600 to 1000 yards, and connected when possible by wire entanglements. Such defenses can be made more or less strong and defensible, depending on time and conditions. See FORTIFICATION.

BLOCK ISLAND. An island in the Atlantic, 10 miles south of the Rhode Island shore, and northeast of Long Island (Map: Rhode Island, B 6). It is about 8 miles long and from 2 to 4 miles wide, forming the town of New Shoreham, Newport County, R. I., well known as a popular summer resort. There are lighthouses on the northern and southeastern extremities. The island was named by Adrian Block, who visited it in 1614; was first settled in 1662, and was captured by French privateers in 1689. In 1720 a ship bearing emigrants from the Palatinate was wrecked here; and this, together with the occasional appearance of an *ignis fatuus* off-shore, gave rise to the legend which forms the subject of Whittier's "The Palatine" and of Dana's "The Buccaneers." Population, in 1890, 1320; in 1900, 1396. Consult Livermore, *A History of Block Island from 1614 to 1876* (Hartford, 1877).

BLOCK PRINTING. See PRINTING.

BLOCKSBERG, blŏks'bĕrk (corrupted, in German popular speech, from *Brocksberg;* the Brocken Mountain). A name given to various mountains and hills in Germany, but preëminently to the Brocken, 3745 feet, the highest point of the Harz Mountains, and, indeed, of the north of Germany (Map: Germany, D 3). In old legend it is the favorite haunt of the witches, where they celebrate the night of the first of May, *Walpurgisnacht* (see WALPURGA), with wild orgies. Almost all mountains thus haunted have been famous as places of sacrifice in the ages of paganism. See BROCKEN.

BLOCK-SIGNAL SYSTEM. A method in use on railways to insure increased safety by keeping trains a certain distance apart, by dividing the line into blocks or sections, the entrances to which are guarded by appropriate signals for the government of the train. The blocks may be of any reasonable length, depending upon the physical characteristics of the line and the frequency with which the trains are run. On lines of heavy traffic the blocks are often only several hundred yards long, while on lines with a light traffic they may be several miles in length. The block systems used in modern railway practice are: (1) The manual; (2) the controlled manual; (3) the auto-manual; (4) the automatic, and (5) the train staff or machine. In manual blocking the signals at the entrance to each block are operated and controlled by the signalman at that station. In controlled manual-block systems the signals at the entrance of each block are controlled either electrically or mechanically by the signalman in the next station ahead, but

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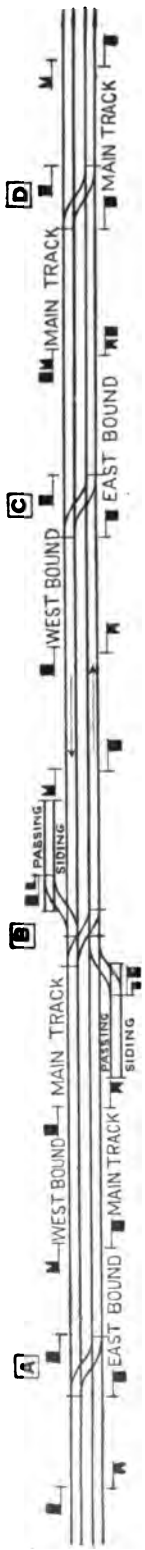

are operated by the signalman at the entrance to the block. In the auto-manual the signals are operated as in the manual or controlled manual systems, but are placed in the danger position automatically by the train after the rear car passes them. In the automatic system the operation of the signals is entirely automatic, generally through the agency of electricity or a combination of electricity and compressed air, and no signalmen are required. In train-staff blocking a special machine is located at the entrance to each block which contains a number of train staffs. The engine-driver receives one of these staffs upon approaching the block and until this staff is carried to the next block and inserted in the machine there, no more staffs can be taken from the first machine. The control between the two machines is maintained by electricity. With any of these systems either absolute blocking or permissive blocking may be practiced. In absolute blocking, two trains are never allowed to be in the same block at the same time. In permissive blocking, a second train may be allowed after a certain time has elapsed to enter a block before the first train has left it, the second train being compelled to run at decreased speed and observe caution.

The accompanying diagram shows a double-track railway arranged with block-signals. The blocks are the spaces between A—B, B—C, and C—D. At A, B, and C there are signal-stations, with three signals for each track. These signals are an advance signal, a distant signal, and a home signal. Should all these signals be at safety, the train passes the station into the next block, but should the home signal be at danger the train stops. The advance and distant signals are simply to show the engine-driver the condition of the home signal sufficiently in advance to permit him to slow up his train ready for a stop should it be at danger. The form of signal most commonly used is a semaphore arm pivoted to an upright post. When this arm is horizontal the signal is at danger, and when it hangs down in an inclined direction the signal is at safety. For distant signals the end of the semaphore arm is notched. Often disk signals are used instead of the semaphore arm. At night inclosed lights take the place of the semaphore arm. Formerly, a white light meant safety, a red light danger, and a green light caution; but of late years green has been adopted for safety and red for danger, with yellow or a combinations of colors for caution. In all but the automatic systems the signals are thrown to safety (they are so arranged that they always stand at danger until pulled to the safety position) by pulling the levers resembling the reversing lever of a locomotive. These levers are located in the signalman's tower, and are connected to the signals by means of wires or rods. In the automatic system these signals are operated by the train itself; the wheels pass over track instruments or levers and set in motion certain mechanical or electrical operations, as a result of which the signals are removed.

In manual blocking, which is extensively used in England, each signalman controls the signals at his station. The code signaling between the block stations is generally done by means of electric bells. British lines also use in manual blocking an indicator giving a visual indication of the condition of the block. The block station has, for each block, an indicator connected by an electric circuit with a similar instrument at the other end of the block. On the dial of the indicator appear the words, 'line clear,' 'train on line,' and 'line closed.' By placing the hand of the indicator over any of these phrases, the instrument at the other end gives a like indication. The method of operation of the system as follows: Attention is first called on the bell, and then station A will give to station B what is called the 'be ready' signal, consisting of a certain number of strokes on the bell, varying so as to indicate the nature of the train. The man at station B, if the previous train has passed his station and he knows that the block between A and B is clear, repeats this signal. The train is then dispatched from A, the man at A gives the signal 'train on line,' the man at B acknowledges this by moving his own indicator, and, through the connection, the one at A to 'train on line,' and at once gives the 'be ready' signal to station C. As soon as the train has passed B the man at B moves his indicator, and therefore the indicator at A, to 'line clear'; and upon this being acknowledged by A the indicator is left vertical, signifying 'line closed,' and the operation has been completed so far as that particular train and particular block are concerned.

In controlled manual blocking, the manipulation of the signals at the entrance to the block is controlled electrically by the signalman at the block station in advance. In what is termed the auto-manual system there is at each block station a track circuit of at least two or three rail-lengths, which is used for automatically replacing the home signal to danger when the rear end of a train passes that signal. The locking instruments are generally placed in front of the signalman and over the levers with which they operate. Each block station has one of these instruments for each block, the two instruments at the opposite ends of a block being connected by an electric circuit. The code signaling between the stations is accomplished by bell, as in manual blocking. The mode of operation is as follows: Prior to starting a train from A, the signalman there asks B to unlock the signal at A; and when B does so A throws his signal to safety, allowing the train to proceed toward B. As the rear of the train passes the home signal at A,

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that signal is thrown to danger by the local track circuit. As soon as his home signal goes to danger, A throws his lever to its normal position of danger, thereby locking it so that the signal cannot be thrown to safety again without permission from B. A drop-slide indicator or annunciator forms a part of the electric mechanism, displaying through a slotted opening on the front of the instrument-case the words 'free,' 'locked,' and 'train in block.' By a system of electric locking working in connection with the indicators, and operated in part by the train through track circuits, B is unable to clear A while there is a train in the block.

Automatic block-signals are usually operated through the agency of electricity alone or a combination of electricity and compressed air by the passage of trains into and out of the block. A track circuit is generally used for conveying the electric current to the signals. In arranging a track circuit, a battery is placed at the advance end of the block. A relay and a signal are placed at the other end. Each line of rails is connected with a pole of the battery. The current passes along the rails of one side of the track, through the relay, thence along the rails of the other side of the track, thus forming a circuit. The relay controls a local circuit, which works an electromagnet, which in the simple electric system actuates the signal, and in the electro-pneumatic system permits compressed air to operate it. Automatic block-signals are operated on two plans: (1) The 'normal safety' plan, in which the signals always show safety unless the block is obstructed; (2) the 'normal danger' plan, in which the signals always show danger at all times, except when cleared by an approaching train, which can be done only when the block is clear of trains and other obstructions. When the head end of a train enters an automatic electric block the current short-circuits, that is, takes the shortest path back to the battery, through the axles of the locomotive or car, and is thereby cut off from the relay, which then breaks the local circuit operating the signal. When the signal is passed by the rear end of the train it goes to danger. In the 'normal safety' plan, when the train passes out of the farther end of the block, the signal again goes to safety. In the 'normal danger' plan the currents are so arranged that the signal is set at danger until it is again cleared by an approaching train.

A train-staff machine consists of an iron pillar with a vertical slot through nearly its entire length, in which is a supply of staffs. The head of the machine, called the 'locking-case,' contains the electrical apparatus for manipulating the machine. Only one staff can be withdrawn at a time from the two machines governing a block; and this only with the consent of the signalman at the receiving station, who alone controls the staffs at the sending station. Another staff cannot be removed from either machine until the one already out is restored at one or the other end of the block. The following is the method of operation: Before starting a train from A toward B, the situation in the block is ascertained by means of the bell code. If the block is clear of trains and obstructions, B, when asked, unlocks A's machine. This allows A to withdraw one staff, which is given to the engineman, who, on arrival of the train at B, hands it over to the signalman there to place in his machine. As neither of the machines governing the block can be unlocked while the engineman has his staff, it is of course impossible to furnish a staff for another train until the first staff has been returned. The train-staff system is essentially a single-track system.

The preceding paragraphs describe the typical methods of block-signaling, without describing the apparatus employed. This varies considerably, and in so many details that it can be treated clearly only in a special treatise. The actual operation of the block system dates from December, 1839, when the Great Western Railway of England began telegraphing the arrival of its trains from station to station for short distances near London. The block system was introduced into the United States by the Pennsylvania Railroad in 1876. Block-signaling is now universal in England, but it has been adopted in full or in part on only a few American railways.

BLOCK TIN. An inferior variety of tin in the form of blocks. When the metal is reduced from its ores it is first poured into molds, and the ingots thus procured are heated to incipient fusion in a reverberatory furnace, when the pure tin fuses and is withdrawn; and the less pure tin which is left behind is melted at a higher temperature, poured into molds, and called block tin. See TIN.

BLODGET, LORIN (1823-1901). An American physicist and statistician. He was born in Chautauqua County, N. Y. In 1851 he became assistant at the Smithsonian Institution in charge of matters relating to climate and atmosphere. In 1857 he issued *Climatology of the United States and of the Temperate Latitudes of the North American Continent*, a work highly praised by Humboldt. He was for several years editor of the *North American* and secretary of the Board of Trade in Philadelphia, and had charge of the statistical work in the United States Treasury. His contributions on finance, industrial progress, and kindred subjects comprise many volumes.

BLOEMAERT, blōō'märt, ABRAHAM (1564-1651). A Dutch painter and engraver, born in Gorkum. He studied under Joost de Beer in Utrecht, and Hieronymus Francken in Herenthals, and was dean of the Guild of Painters in Utrecht from 1611 to 1628. He painted biblical and mythological scenes, flower-pieces, landscapes, and portraits. His works include: "Hippomenes Crowned in the Arena" (1626); "Old Man's Head" (1635); "Joseph's Second Dream;" and "Saint John Preaching in the Desert."

BLOEMEN, blōō'men, PIETER VAN (called STANDAERT) (1657-1720). A Flemish painter, born in Antwerp. He studied under Simon van Douw; spent some time in Italy, and in 1699 was appointed dean of the Guild of Saint Luke in Antwerp. His works include "Ruin with Cattle" (1710); "Halt before an Inn" (1718), and many other pictures, chiefly of military life, or landscapes.

BLOEMFONTEIN, blōōm'fŏn-tĭn. The capital of the former Orange Free State, now the Orange River Colony, South Africa, near the Modder River, 95 miles east by south of Kimberley (Map: Orange River Colony, C 8). It is situated at an altitude of over 4450 feet, and is well built and lighted by electricity. There are a number of fine public edifices, among which the

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chief are the President's house, the town-hall, and the museum. Bloemfontein contains also several educational institutions, including colleges and a theological school. Its favorable climate has made the town of importance as a health resort. A considerable trade, particularly in wool, is carried on. Population, in 1899, about 12,000. During the war between Great Britain and the South African Republics, Bloemfontein attained considerable importance as one of the chief centres of the Boer strength. After the forces of the Transvaal and the Orange Free State had been twice defeated in the neighborhood of the town, it surrendered to Lord Roberts on March 13, 1900.

BLOIS, blwä (Med. Lat. *Blesum, Blesis, Bleza*). The capital of the Department of Loir-et-Cher, France, finely situated on the slopes of a hill, on the right bank of the Loire, 35 miles southwest of Orleans (Map: France, H 4). The main street traverses a hollow, flanked by elevations, dominated respectively by the castle and the cathedral. The streets in the upper part of the town are narrow and tortuous, and the houses mean and ill built. Besides the Cathedral of Saint Louis, a structure in bastard Gothic, the most notable ecclesiastical edifice is the abbey Church of Saint Nicolas, built in 1138-1210. Blois's educational establishments comprise a college, teachers' school, two seminaries, a museum, and library. It has manufactures of wearing apparel, porcelain, and chocolate. A fine aqueduct of Roman origin, cut in the solid rock, supplies the city with water. A bridge across the Loire connects Blois with the suburb of Vienne. The most interesting edifice of the city is the old castle, situated on the highest ground. The earliest part dates from the Thirteenth Century, while the finest portion, the Francis I. wing, with its admirable staircase, ascending within a projecting pentagonal tower, adorned with exquisite carvings both outside and inside, was built in the Sixteenth Century, and is a masterpiece of the early French Renaissance. The outer as well as the inner façades are richly decorated. The castle has been the scene of many interesting historical events. Louis XII. was born in it, and under its roof Charles, Duc d'Alençon, and Margaret of Anjou were married. The courts of Francis I., Henry II., Charles IX., and Henry III. were held here occasionally, and in the castle the Duke of Guise and his brother were murdered, by order of Henry III., on December 23, 1588. Isabella, queen of Charles VI., here found a retreat; it served as a prison for Maria de' Medici; Catharine de' Medici died within its walls; and Maria Louisa held her Court here in 1814, after Paris had capitulated. Population, in 1896, 23,542. Consult Le Nail, *Le Château de Blois* (Paris, 1874).

BLOK, blŏk, PETRUS JOHANNES (1855—). A Dutch historian, born at Helder. He studied at Leyden, and in 1884 was made professor of history at Croningen. He later occupied the same position at the University of Leyden, and during Queen Wilhelmina's historical studies acted as her instructor. Blok's researches have been in connection with the social-political history of the Netherlands, especially during the Middle Ages. Among his works are: *Eene Hollandsche stad in de middeleeuwen* (Hague, 1883); *Eene Hollandsche stad onder de Bourgondisch-Oostenrijksche heerschappij* (Hague, 1884); *Geschiedenis von het Nederlandsche Volk* (Croningen, 1892), translated by Miss Ruth Putnam, as the *History of the People of the Netherlands* (New York, 1898-1902).

BLOMFIELD, blŏm'fēld, CHARLES JAMES (1786-1857). Bishop of London; a learned and influential prelate of the Church of England. He was born May 29, 1786, at Bury Saint Edmund's, in Suffolk, 60 miles northeast of London, where his father was schoolmaster. Being well grounded by his father in the classics, Blomfield went to Cambridge, where he took high honors, B.A., 1808, and became fellow of Trinity College. After he had filled several curacies, the Bishop of London appointed him his chaplain, in recognition of his acknowledged philological and theological acquirements. Shortly after, he was called to the living of Saint Botolph; in 1824 he was made Bishop of Chester, and in 1828 he was promoted to the See of London, on the translation of Bishop Howley to Canterbury. Blomfield's reputation for classical scholarship rests chiefly on his editions of *Callimachus* (London, 1815), and of several of the dramas of *Æschylus*. In connection with Rennel, he published the *Musæ Cantabrigienses*, and with Monk (1812), *Posthumous Tracts of Porson*, and in 1814 the *Adversaria Porsoni*. He also published lectures on the Gospel of John and on the Acts (1823-28, 3d ed. 1838). Blomfield was exceedingly active in the superintendence of his diocese, and was a prime mover in the agitation for the erection of new churches. Under his presidency more churches were erected in London than under any other bishop since the Reformation. He died in London, August 5, 1857. For his biography, consult Blomfield (London, 1863, 2 vols., 2d ed. 1864).

BLOMMAERT, blŏm'märt, PHILIPP (1809-71). A Flemish historian and philologist. His most noted work is *History of the Belgians* (*Aloude geschiedenis der Belgen*, Ghent, 1849), urging a German policy as opposed to the French. He published also mediocre poems (1834), a Flemish translation of the *Nibelungenlied* (q.v.), and learned editions of old Flemish poems of the period from the Twelfth to the Fourteenth Century, *Oudvlaemsche gedichten* (Ghent, 1838-51), and *Theophilus* (ib. 1858).

BLOMMAERT, SAMUEL (1590-1670). A Colonial patroon. He bought from the Indians a large tract of land, extending from Cape Henlopen to the mouth of the Delaware River—a tract almost the size of the present State of Delaware. The purchase was ratified by Peter Minuit and his Council at Fort Amsterdam in 1630, and is the oldest deed for land in Delaware. The other owner of the land, Samuel Godyn, with Kiliaen Van Rensselaer, De Laet, and De Vries (q.v.), formed a company to settle this tract, and a colony of thirty was started at Lewis Creek under the governorship of Gillis Hosset. In the same year twelve square miles were added to the company's land by a purchase recorded at Fort Amsterdam. The colony, which had been named Swaanendale, was after a few years destroyed by the Indians in revenge for an act of Hosset's.

BLOMSTRAND, blŏm'strand. CHRISTIAN WILHELM (1826-97). A Swedish chemist, born at Wexiö. He studied at the University of Lund, and from 1862 to 1895 was professor of

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chemistry and mineralogy there. In 1861 he undertook a scientific expedition to Spitzbergen, and in the same year was elected a member of the Stockholm Academy of Sciences. He discovered manganosite, vallerite, and other minerals, wrote several valuable text-books on organic chemistry, and also published *Die Chemie der Jetztzeit vom Standpunkte der elektrotechnischen Auffassung aus Berzelius's Lehre entwickelt* (1869), and other treatises.

BLON'DEL, *Fr. pron.* blōn'dĕl'. A noted French minstrel of the Twelfth Century, called a native of Nesle, a place difficult to identify. According to tradition, Blondel was the favorite of Richard the Lion-hearted, King of England, whom he accompanied to Palestine. While returning to England Richard was imprisoned by Leopold, Duke of Austria, and Blondel, determined to find his master, wandered through Germany in disguise until he came to the Castle of Dürrenstein, which he heard contained an illustrious captive. Feeling assured that Richard was in the castle, he tried to see him, but failing, began to sing a song which he and Richard had composed. The first stanza was hardly sung before the well-known voice took up the second. The minstrel was overjoyed, and returning with all speed to England, was the means of securing Richard's ransom. Blondel's poems were published at Rheims, in 1862, by Prosper Tarbé, under the title *Les Œuvres de Blondel de Néelle* (Rheims, 1862).

BLONDEL, blōn'dĕl'. The name of two French architects. (1) François Blondel (1617-86). A diplomat, littérateur, military engineer, and mathematician. He was noted for the triumphal arch of the Porte Saint Denis, in Paris (1674), as well as the Porte Saint Antoine, and became director of the new Académie de l'Architecture in 1672. He published *Cours d'architecture enseigné dans l'académie royale* (1675). (2) Jacques François Blondel (1705-74). An architect and engraver. He founded one of the earliest French private schools of architecture (1743), and became royal architect. He designed buildings at Metz, Strassburg, and elsewhere.

BLONDIN, blōn'dăn', Charles Emile Gravelet (1824-97). A French acrobat, born at Saint-Omer. He became an exceedingly expert tight-rope walker, and attracted much attention by crossing the cataract of Niagara on a rope in 1855, 1859, and 1860. Subsequently he gave exhibitions in Europe and at the Crystal Palace, London.

BLOOD (probably akin to the verb *to blow*, to be in bloom). From the standpoint of histology, blood is usually classed as a tissue. It is developed from the middle layer, or mesoderm, of the embryo, and differs from the other tissues of the body in that its intercellular substance, the *liquor sanguinis*, or blood-plasma, is fluid instead of solid. When a drop of human blood is examined under the microscope, there are seen floating in the plasma certain formed elements. We distinguish three main forms: the red blood-cell, or corpuscle; the white blood-cell, or corpuscle; and the blood-plaques, or platelets.

The Red Blood-Cells. These are minute biconcave disks, averaging 7 to 8 micromillimeters, or about 1-3200 of an inch in their long diameter, and about one-fourth that in thickness. In adult human blood these cells are not nucleated, although in the human embryo they contain nuclei. This round, discoid, non-nucleated red blood-cell is characteristic of mammals with the exception of the camel family, in which the red blood-cells are non-nucleated, but oval. In birds, reptiles, amphibians, and fishes (with the exception of Cyclostomata, which have nucleated, but round cells) the red blood-cells are oval in shape and contain nuclei. As regards size, the largest corpuscles are found in the amphibia; those of the Amphiuma being as much as 75 micromillimeters in diameter, so that they may be distinguished by the unaided eye. The following table shows the size of the red blood-cells in some of the more common mammals:

Elephant	.0092	millimeter
Man	.0079	"
Dog	.0071	"
Rabbit	.0070	"
Mouse	.0067	"
Horse	.0059	"

In normal human blood there are about 5,000,000 red blood-cells per cubic millimeter of blood. As a general rule woman's blood has somewhat fewer than man's. In different animals the number of red cells varies greatly, and the number of cells per cubic millimeter is much reduced in the lower animals, which have very large corpuscles. The redness characteristic of blood is not evident in a single corpuscle, which appears of a light straw-color. When, however, a large number of the cells are seen together, the mass appears bright-red. The red blood-corpuscles are embryologically of mesoblastic origin, beginning their life-history as nucleated cells and as such possessing amœboid movement and reproductive powers. At birth all nuclei have been lost as well as the powers of movement and of reproduction. After birth the production of new red corpuscles is believed to occur mainly in the marrow of bones. The question as to the possibility of determining by microscopical examination whether a specimen of blood, particularly a blood-stain, is human or animal, often presents itself in trials for murder. By reference to the table given, it will be seen that the red corpuscles in a considerable number of animals so closely approximate in size those of man that a positive answer to the question is often impossible. Then the drying of the corpuscles in a clot, which has to be softened with salt solution before examination can be made, introduces an uncertainty as to whether such corpuscles preserve their normal dimensions. On the other hand, it will be noted that a differentiation between human blood and that of lower animals whose red corpuscles are oval and nucleated—for example, birds and fishes—is comparatively easy.

The White Blood-Cells. These are much fewer in number than the red cells, the average being about one white cell to every four or five hundred of the red. The proportion, however, varies. They are slightly larger than the red cells, averaging about 8 to 10 micromillimeters in diameter. Their shape varies, largely from their amœboid movement. They are nucleated, and the protoplasm of the cell-body is more or less granular. Several varieties of the white blood-cell are recognized, which may be classified as follows: (1) *Lymphocytes*, large and small, having a round nucleus surrounded by a small rim of cell-body; and (2) *Leucocytes*, which may be further subdivided into large mononuclear leucocytes, in which there is a round

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or oval nucleus with considerable cell-body; transitional forms, in which the nuclei are irregular in shape; polynuclear leucocytes, in which there are several nuclei, and eosinophile leucocytes, which have in their cell-bodies large granules which stain bright red with eosin. The amœboid movement of the white cells enables them to change their shape and to accomplish some locomotion. In this way they pass through the walls of the capillaries into the tissues, where they are known as wandering cells. (See CONNECTIVE TISSUE.) The blood-platelets are small, non-nucleated, round or oval bodies, about one-third the diameter of a red blood-corpuscle. They are found usually in groups and are prone to disintegration. Their function is unknown, but there is reason for believing that they are concerned in the process of coagulation when it occurs. Embryologically the white blood-cells are derived, like the red cells, from the mesoblast. In the adult, new white cells are derived by reproduction. This reproduction seems to occur largely in the lymphatic organs, especially the spleen.

THE PLASMA. The fluid portion of the blood, called the plasma, consists of water containing calcium salts, the chlorides of sodium and potassium, phosphates, albumen, and other proteid substances, as well as fatty and extractive substances. If blood escapes from the body, coagulation or clotting occurs; after standing a while, the blood separates into a contracting semi-solid mass, the clot, and a thin red fluid, the serum. The clot is composed of the red blood-corpuscles matted together with fibrin (q.v.). The process of clotting is accelerated by cold. In the body, clotting of the blood may occur in the blood-vessels, in case of an obstruction to the blood-stream or infection by bacteria; or it may occur in the neighboring tissues where a blood-vessel is ruptured. After death the blood remains fluid in the capillaries, but clots in the veins. Clots are sometimes found in the cavities of the heart. Certain diseases cause alterations in the blood. In a condition called *hæmophilia* the blood clots with difficulty, if at all (see BLEEDING); and persons possessing this peculiarity are liable to bleed to death from a small wound, as that left by drawing a tooth. This peculiarity is called the hemorrhagic diathesis, and it is found more often among Germans.

The color of the blood is due to the hæmoglobin (q.v.) of the red blood-corpuscles, which is the carrier of oxygen from the lungs to the different tissues. (See RESPIRATION.) Consult Cabot, *Clinical Examination of the Blood* (4th ed., New York, 1901).

BLOOD, CORRUPTION OF. See ATTAINDER; FORFEITURE.

BLOOD, EATING OF. As among other peoples of antiquity, so among the Hebrews the blood of animals was regarded as the seat and source of life, and hence the blood was forbidden as food. All animal food being originally of a sacrificial character, the prohibition against the eating of the blood, carried back by tradition to the days of Noah (Gen. ix. 4), is thus shown to be connected with sacrificial observances. See SACRIFICE.

BLOOD, THOMAS (1618-80). A bold and successful adventurer, commonly known as 'Colonel Blood.' He was the son of a prosperous blacksmith, and was probably born in Ireland, but the place of his birth is uncertain. In the great Irish rebellion he served with the Parliamentary Army. He visited England, married a Lancashire lady, was made a justice of the peace by Henry Cromwell, and received large assignments of land in Ireland. He was deprived of these at the Restoration, and in a spirit of reprisal associated himself with several disbanded Cromwellians who were ripe for mischief. He put himself at the head of an insurrectionary plot, which was to begin with the seizure of Dublin Castle, and of Ormond, the Lord Lieutenant. On its discovery he escaped, while his chief accomplices were seized and executed, although he made a bold attempt to rescue them. He remained in hiding, but eventually fled to Holland, where he was received with high consideration. He soon found his way back to England, to try what mischief might be brewed among the Fifth-Monarchy men. Finding no prospects of success, he repaired to Scotland, invited by the turbulent state of affairs, and was present at the fight of Pentland, November 27, 1666. On the night of December 6, 1670, the Duke of Ormond was seized in his coach in Saint James's Street by a gang of bravoes, tied on horseback behind one of them, and hurried away toward Tyburn. The timely approach of his attendants at the moment when he had succeeded in struggling with his riding companion to the ground probably saved him from hanging. The leader in this daring villainy was Blood, and so well had he contrived it that he did not even incur suspicion. His next enterprise was still more wild and dangerous. On May 9, 1671, disguised as a clergyman, and accompanied by his former accomplices, he entered the Tower with the determination to carry off the regalia of England. After almost murdering the keeper of the jewels, he succeeded in carrying off the crown under his cloak, while one of his associates bore away the orb. They were immediately pursued, however, seized, and committed to the Tower jail. But a singular turn of fortune awaited Blood. At the suggestion of Buckingham, who was accused of having hired Blood to attack the Duke of Ormond, King Charles visited the dauntless miscreant in prison, and, dreading the threat that there were hundreds of Blood's associates banded together by oath to avenge the death of any of the fraternity, pardoned him, took him to Court, restored to him his Irish estates, valued at £500 a year, and raised him so high in favor that for several years Colonel Blood was an influential medium of royal patronage. After the fall of the 'Cabal' ministry, Blood became hostile to Buckingham, and, accused of originating a scandalous charge against him, was committed to prison. He was bailed out and died in his own house in 1680. Scott introduces Blood in *Peveril of the Peak*. Consult Seccombe, *Lives of Twelve Bad Men* (New York, 1896).

BLOODBIRD. The name in southern Australia of several wax-billed finches and other small birds marked with bright red, especially the 'soldier-bird' (*Myzomela sanguinolenta*), a beautiful species of honey-eater, black, with the head, neck, breast, and back of the male rich scarlet.

BLOOD-CLAM. See ARK-SHELL.

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BLOOD FEUD (AS. *fæhf*, from *fah*, inimical; OHG. *fēhide*, injury, enmity, Ger. *Fehde*, feud). In primitive society, the legalized right of private vengeance for crimes of violence. The institution of the feud and its regulation by law, involving, as it does, a restriction on the primary impulse of revenge, marks a great advance in the direction of a settled social order. The primitive theory of the responsibility of the family, clan, and tribe for the acts of its members tended to convert an act of private vengeance into a state of war. The developing sense of law and order restricted the right of vengeance to the immediate family, or next of kin, called the 'avenger of blood' (see AVENGER OF BLOOD) of the injured person, and limited the punishment to the person committing the crime or to those who protected him from the vengeance incurred. The right was further restricted by the doctrine of sanctuary (q.v.) and the institution of places of refuge for the manslayer fleeing from the avenger of blood (see ASYLUM; CITY OF REFUGE), and, at a later period, by the institution of the wergild (q.v.), with which the hunted criminal might purchase exemption from the vengeance due him. Ultimately the acceptance of this blood-money (q.v.) became compulsory, and the codes of early law which have come down to us are full of minute regulations fixing the amount to be paid for various crimes of violence according to the state or dignity of the victim of the crime, and specifying the persons entitled to share in the payment.

The stage of society marked by the blood feud has prevailed among most of the primitive peoples with whom we are acquainted, and it forms a part of nearly all systems of primitive law. We find marked traces of it in the Mosaic legislation, and it constitutes an important part of the law of the Teutonic communities which planted themselves on the ruins of the Roman Empire. Anglo-Saxon law is largely concerned with it, and in England it survived, nominally, at least, in the form of the wager of battle, until abolished by act of Parliament in 1819. (See BATTLE, TRIAL BY; FEUD.) Consult: Jenks, *Law and Politics in the Middle Ages;* Maine, *Ancient Law* (11th Eng. ed., London, 1887), and *Lectures on the Early History of Institutions* (6th ed., London, 1893); Pollock and Maitland, *History of English Law* (2d ed., London and Boston, 1899); and Stephen, *History of the Criminal Law of England* (London, 1883).

BLOODFLOWER (*Hæmanthus*). A genus of bulbous-rooted plants, of the natural order Amaryllideæ, embracing about 60 species, mostly natives of South Africa, some of which are among the prized ornaments of our greenhouses. They take their name from the usual color of their flowers, which form a fine head or cluster, arising from a rosette of root-leaves. The fruit is a berry, usually with three seeds. The leaves of the different species exhibit considerable diversity of form, in some almost linear, in others almost round; in some, also, they are erect, in others appressed to the ground. The bulbs of some of the finest species of bloodflower being very slow to produce offshoots, a curious method of propagating them is resorted to by gardeners, which is occasionally practiced also with other bulbous-rooted plants, by cutting them across above the middle, upon which a number of young bulbs form around the outer edge. *Hæmanthus multiflorus*, *Hæmanthus lindeni*, and *Hæmanthus puniceus* are among the most handsome in hothouse cultivation. *Hæmanthus albiflos* has white flowers, and some of the others are grown as oddities. The inspissated juice of *Hæmanthus toxicarius*, now known as *Buphane disticha*, is used by the natives of South Africa for poisoning their arrows.

BLOODHOUND, or SLEUTH-HOUND. A variety of hound often used in tracking criminals. See HOUND.

BLOODLETTING. See BLEEDING.

BLOOD-MONEY. In early law, the compensation paid by a manslayer to the next of kin of the man slain, securing the offender and his relatives against subsequent retaliation. It was common in Scandinavian and Teutonic countries until after the introduction of Christianity. The amount of the payment was fixed by law, as well as the persons who were entitled to exact and share it. (See AVENGER OF BLOOD.) The principle was not limited to cases of manslaughter, but was ultimately extended to all crimes of violence. Certain crimes, however, by reason of their enormity or their sacrilegious character—as slaying a person in church or when sleeping—or because they involved a breach of the King's peace, were 'bootless,' i.e. incapable of commutation for money. The perpetrator of such an offense came under the King's ban, was outlawed, and abandoned to his enemies. (See BANISHMENT; OUTLAWRY.) Even in such a case, however, it is provided in one of the barbaric codes of the Middle Ages that the offender "may redeem himself from the wilderness with 40 marks when the injured party has interceded for him." See BLOOD FEUD; WERGILD, and the authorities there referred to.

BLOOD OF OUR SAVIOUR, also called ORDER OF OUR REDEEMER AND THE PRECIOUS BLOOD OF JESUS CHRIST. An order of knighthood in Mantua, instituted by Duke Vincenzo Ganzaga in 1608, on the occasion of the marriage of his son with a daughter of the Duke of Savoy. It consisted of twenty knights, the Mantuan dukes being sovereigns. The collar was embroidered with scrolls containing ingots of gold in crucibles over a fire, with the words *Domine probasti me.* To the collar was pendant an oval medallion with two angels kneeling before an altar, on which were three drops of blood, with the words *Nihil isto triste recepto.* The name originated in the belief that in Saint Andrew's Church, in Mantua, certain drops of our Saviour's blood are preserved. Consult: Laurence-Ascher, *Orders of Chivalry* (London, 1887); Wahlen, *Ordres de Chevalerie* (Brussels, 1844).

BLOOD OF SAINT JANUARIUS, jăn'ū-ā'rĭ-ŭs. See JANUARIUS, SAINT.

BLOOD-PHEASANT, fĕz'ant (from the red color about the throat and breast). One of the small and beautiful Himalayan quail-like pheasants, of the genus Ithaginis. See PHEASANT.

BLOOD-POISONING. See PYÆMIA.

BLOOD-RAIN. A shower leaving red stains, due essentially to microscopic organisms containing red oxide of iron. The organisms consist of fungi, numerous specimens of which are carried down from the atmosphere by rain and snow.

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Such organisms are often capable of imparting to snow a pink, red, or bluish tint, and sometimes exhibit the phenomenon of phosphorescence. Similarly, black rain may be caused by the presence of a black fungus. The above-mentioned low forms of plants grow, especially in torrid zones, in ponds that hold water during a short season of each year, being dried up during seasons of drought which last for several months. From these desiccated basins the fine dust and minute fungi are raised into the atmosphere by wind and carried for hundreds of miles. Decrease of temperature causes rainfall or snowfall, during which the dust-particles are carried to the earth. The gray dust, consisting principally of diatoms, being rather denser, may descend without rain. Such dust-showers have been observed to fall upon vessels in the Atlantic Ocean as far as a thousand miles west of the coast of Africa. Showers of blood-rain and dust are observed principally over the area lying east, west, and north of the Sahara, but they are not restricted to this region. See ÆOLIAN ACCUMULATIONS; WIND.

BLOODROOT. See SANGUINARIA.

BLOOD-STAINS. In some criminal trials it is a matter of extreme importance to determine whether certain stains found upon various weapons, upon clothing, or upon carpets, walls, furniture, etc., have been made by blood or by some other substance. Further, there comes up the question as to whether a blood-stain has been made by human blood or by the blood of one of the lower animals. The appearance of blood-stains varies, depending largely on the character of the substance stained, age of the stain, etc. As a rule the more permeable the substance, the brighter is the stain. Thus, on cloth the serum is quickly absorbed, leaving a rather bright stain from the colored elements of the blood; while stains on hard surfaces, such as metal and polished wood, are usually of a dark color. The question as to whether a given stain is blood is in most cases comparatively easy to answer. The determination may be made by chemical means, by the use of the microscope, or that of the spectroscope. The *Guaiacum test* is as follows: If a drop of blood, or a drop of water with which a blood-stain has been moistened, be placed upon a blotting-paper and a drop of tincture of guaiacum added, the further addition of a drop of hydrogen peroxide will result in the production of a sapphire-blue color. The fact that certain substances other than blood may give this or a similar reaction tends to vitiate the value of this test. Another test, known as the *Hemin test*, is as follows: To a little of the powder scraped from a blood-stain is added a drop of glacial acetic acid with a trace of sodium chloride. After standing for some time the mixture is gently heated. As evaporation takes place the specimen should be examined under the microscope, when numerous rhomboidal crystals will be seen of a reddish, brown, or yellow color. These are produced from the coloring matter of the blood, and are known as hemin crystals. A positive result from this test is extremely reliable. On the other hand, a failure to obtain crystals cannot be considered positive proof that the stain is not blood. Very accurate results may be obtained by *spectroscopic* examination of blood-stains. The fact that hemoglobin (from a fresh stain) and hematin (from an old stain) exist each in two states of oxidation, and that each state has its own characteristic absorption bands in the spectrum, increases the accuracy of this test. The *microscope* alone is often of value in determining the nature of blood-stains. Thus, if a stain be moistened with a little normal saline solution (sodium chloride 6 per cent. in water), and some of the fluid be examined under the microscope, it is often possible, even in the case of very old stains, to recognize the blood-corpuscles.

The differentiation of the blood of a man from that of a woman or child, or of the blood of one person from that of another, is apparently impossible. The differentiation of a human blood-stain from a stain made by blood from one of the lower animals is mentioned in the article BLOOD (q.v.).

BLOODSTONE. See HELIOTROPE.

BLOOD-TRANSFUSION. See TRANSFUSION OF BLOOD.

BLOOD-VESSELS. Tubes of various sizes which serve as channels for the passage of the blood to the different organs and tissues of the body. While all are connected with one another and with the heart, three main forms of vessels may be differentiated, depending on size, function, and structure. These are capillaries, arteries, and veins.

CAPILLARIES. These are the smallest of the blood-vessels. They form extensive networks in almost all tissues and organs, and serve as connection between the arteries on the one hand and the veins on the other. Their average size is from 7 to 12 micromillimeters. It is thus seen that they are little larger than the corpuscles which pass through them. The wall of a capillary consists of a single layer of endothelial cells. These cells are large and flat, with bulging nuclei, and are united to one another by cement substance. This single layer of endothelium serves as the lining of the entire vascular system, extending uninterruptedly throughout capillaries, arteries, veins, and heart.

ARTERIES. Passing from a capillary toward the artery, the first change noted is the addition of a little connective tissue outside of the endothelium. This is the beginning of the outer coat of the artery, and is known as the *tunica adventitia*, or the *adventitia*. A few muscle-cells next appear between the connective tissue and the endothelium and this small vessel with three coats, an outer connective tissue coat (*adventitia*), a middle coat consisting of a single layer of smooth muscle-cells (*tunica media* or *media*), and the lining endothelium (*tunica intima* or *intima*), is called an arteriole. In a larger artery these same coats are present, but more complex. Thus the *intima*, instead of being a single layer of endothelium, consists of three layers — an inner endothelial, a middle layer of connective tissue, and a limiting elastic membrane. The *media* or muscular coat consists of quite a thick layer of smooth muscle-cells, placed circularly, while the *adventitia* layer is also of considerable thickness.

The aorta differs from other arteries in having a much larger amount of elastic tissue in its walls. This elastic tissue is distributed throughout the muscular coat, almost equaling the muscle-tissue itself in quantity. There is usually no definite elastic membrane limiting the *intima*.

VEINS. These have the same coats as do the arteries. Their walls are, however, thinner and

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present certain points of difference. The endothelial and middle layers of the *intima* are essentially the same as in arteries, but there is no limiting elastic membrane. The result is that there is no sharp line of demarcation between *intima* and *media*. The *media*, instead of being made up almost entirely of muscle, as in the arteries, has intermingled with its muscle-fibres a large amount of fibro-elastic tissue. The *adventitia* is usually thicker than in an artery of corresponding size. Many veins have valves for controlling the flow of blood. These consist of folds of the *intima* with some strengthening bands of elastic tissue and sometimes a few muscle-fibres. See AORTA; BRACHIAL ARTERY; ARTERY; VEIN, etc.

BLOODWORM. The name of various red worms and annelids. That commonly known to British anglers as the bloodworm, used for bait, is the worm-like aquatic larva of a midge (*Chironomus plumosus*), which swarms about stagnant pools.

BLOODY ASSIZ'ES. The name given to a series of trials for treason conducted by Lord Chief Justice Jeffreys in the western counties of England after the suppression of Monmouth's rebellion in 1685. See JEFFREYS, GEORGE.

BLOODY BROTHER, THE, or ROLLO, DUKE OF NORMANDY. The title of a tragedy by Fletcher, and probably Rowley and Massinger (1639). Rollo, the covetous son of the deceased Duke of Normandy, murders his brother, clasped in their mother's arms, and is himself slain by the captain of the guard. Some authorities give the play mainly to Beaumont.

BLOODY MARY. The popular designation of the daughter of Henry VIII., Queen of England in 1553-58, because of the persecution of Protestants which took place during her reign.

BLOODY TOWER. The name given to one of the towers of the Tower of London, in which Richard III. is said to have procured the murder of the young sons of Edward IV.

BLOOM. The white, waxy or glaucous covering of various fruits and leaves, especially common on the leaves of drought plants. See XEROPHYTES.

BLOOM. An appearance on paintings resembling in some measure the bloom on certain kinds of fruit, such as peaches, plums, etc. (hence the name), produced, in all probability, by the presence of moisture in the varnish, or on the surface of the painting when the varnish is laid on. The bloom destroys the transparency, and is consequently very injurious to the general effect of a picture. It is best prevented by carefully drying the picture and heating the varnish before applying it, after which a soft brush should be employed to smooth the surface of the picture, which should be finally placed in the sunshine to dry.

BLOOMER, AMELIA JENKS (1818-94). An American reformer. She was born in Homer, N. Y., and for several years lectured and wrote on the temperance question. She was a prominent advocate of woman's suffrage, but is remembered chiefly for her enthusiastic adoption of the so-called 'bloomer' costume, originally devised and introduced by Mrs. Elizabeth Smith Miller.

BLOOM'ERISM. See DRESS REFORM.

BLOOM'ERY, BLOOM'ARY, or **BLOMARY,** blōōm'ā-rĭ (Engl. *bloom*, AS. *blōma*, a mass or lump, in *isenes blōma*, a lump or bloom of iron). A furnace for transforming pig iron into wrought or malleable iron, or for making such iron directly from ore. See IRON AND STEEL.

BLOOM'FIELD. A town and the county-seat of Green County, Ind., 80 miles southwest of Indianapolis; on the White River, and on the Evansville and Indianapolis and the Louisville, New Albany and Chicago railroads. It has flour and lumber mills, and manufactures of novelties of steel, iron, wood, and clay; and carries on considerable trade in coal, agricultural produce, lumber, grain, and live stock. Population, in 1890, 1229; in 1900, 1588.

BLOOMFIELD. A city and the county-seat of Davis County, Iowa, 70 miles northwest of Keokuk; on the Burlington and the Wabash railroads (Map: Iowa, E 4). It has a public library, a fine high-school building, and the Southern Iowa Normal School. There is some manufacturing, but the more important interests are commercial, a large trade being carried on in the products of the adjacent agricultural region. The city owns and operates its water-works and electric-light plant. Population, in 1890, 1913; in 1900, 2105.

BLOOMFIELD. A town in Essex County, N. J., adjoining Newark, and 11 miles from New York City; on the Erie and the Lackawanna railroads, and on the Morris Canal (Map: New Jersey, D 2). It is the seat of the German Theological Seminary of Newark (Presbyterian), opened in 1869, and contains, among the more prominent features of interest, the Bank Building, Jarvie Memorial Library, and Westminster and First Presbyterian churches, the latter built in 1796. The town has a number of suburban residences, and, as one of its chief attractions, a park developed from the 'Common' used during the Revolution as training-grounds. There are important manufactures, including woolen cloth, silk, electric elevators, hats, rubber goods, paper, pins, and railroad brake-shoes. Under a charter of 1900 the government is vested in a town council, of which one member, elected at large, usually serves as chairman. Population, in 1890, 7708; in 1900, 9668. Settled as early as 1675, Bloomfield was a part of Newark until incorporated as a separate township in 1812. Its present name was chosen in 1796 in honor of General Joseph Bloomfield, a Revolutionary officer, afterwards Governor of New Jersey. Consult Shaw, *History of Essex and Hudson Counties, New Jersey* (Philadelphia, 1884).

BLOOMFIELD, JOSEPH (? -1823). An American soldier, born in Woodbridge, N. J. He attained the rank of major in the Revolutionary War, and from 1801 to 1812 was Governor of New Jersey. He served as brigadier-general in the American Army during the War of 1812, and from 1817 to 1821 was a member of Congress.

BLOOMFIELD, MAURICE (1855—). An American philologist and Sanskrit scholar. He was born in Bielitz, Austrian Silesia, February 23, 1855. He came to the United States in 1867; studied at the old University of Chicago and at Furman University, Greenville, S. C., and was a graduate pupil of William Dwight Whitney's at Yale, 1877-78. He was a fellow of Johns Hopkins University, 1878-79; and then studied in

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Berlin and Leipzig, 1879-81. On his return to America in 1881 he received an associate professorship in Johns Hopkins, and afterwards the full professorial chair of Sanskrit and comparative philology, which he holds in that university. In 1896 Princeton bestowed the LL.D. degree upon him. He is an extensive contributor to the Oriental journals and philological periodicals; and his researches in connection with the Atharva-Veda are especially important. Mention may be made of his edition of the *Kauçika-Sûtra*, New Haven, 1890 (American Oriental Society's Journal, Vol. XIV.); *Hymns of the Atharva-Veda Translated*, Oxford, 1897 (Sacred Books of the East, Vol. XLII.); *The Atharva-Veda*, Strassburg, 1899 (Bühler's *Grundriss der indo-arischen Philologie*); *The Kasmirian Atharva-Veda, reproduction of the manuscript by chromolithography* (Baltimore, 1901); and he is publishing a *Vedic Concordance* (to appear in the Harvard Oriental Series).

BLOOMFIELD, ROBERT (1766-1823). An English pastoral poet. He was born at Honington, Suffolk, December 3, 1766, and was the son of a poor tailor, who died, leaving Robert an infant. His mother with difficulty subsisted by teaching a school, where Bloomfield learned to read. At the age of 11 he was hired to a farmer, but ultimately became a shoemaker in London, where in a poor garret he wrote his *Farmer's Boy*. It was published in 1800, had extraordinary popularity, and was translated into a number of languages. He subsequently published *Rural Tales, Wild Flowers*, and other pieces. Though efforts were made for him by persons of rank, his health broke down, and he died, nearly insane, at Shefford, in Bedfordshire, August 19, 1823. Consult Weston, *Works* (London, 1824); Hart, *Selections from Correspondence* (London, 1870).

BLOOMFIELD-ZEISLER, blōōm'fēld-tsīs'lĕr, FANNY (1866—). An American pianist, born in Bielitz, Austrian Silesia, July 16, 1866. In 1868 her parents came to America, settling in Chicago. At the age of six, before receiving any musical instruction, she began picking out tunes on the piano. In 1877 Mme. Essipoff, then on tour in the United States, heard her play, and advised that she become a pupil of Leschetizky, which she did the following year, remaining with him until 1883. After successful appearances abroad she returned to America, where she has played with the principal orchestras. She also has given many recitals and has made several brilliantly successful foreign tours, playing in the summer of 1896 at Cologne at the Lower Rhine Music Festival. She is one of the foremost living pianists.

BLOOM'INGTON. A city and the county-seat of McLean County, Ill., 126 miles southwest of Chicago; on the Illinois Central, the Chicago and Alton, the Lake Erie and Western, and the Cleveland, Cincinnati, Chicago and Saint Louis railroads (Map: Illinois, D 3). It contains the construction and repair shops of the Chicago and Alton Railroad, and has extensive coal-mining, pork-packing, fruit-canning, and stove-manufacturing interests, besides flour-mills, foundries, furnaces, and brickyards. The city is the seat of the Illinois Wesleyan University (Methodist Episcopal), founded in 1852, and at Normal, two miles north, is the Illinois State Normal University. Bloomington has several parks, a marble court-house, a fine city hall, and a public library of over 22,000 volumes. There is also a soldiers' orphans' home at Normal. Settled in 1831, Bloomington was chartered as a city in 1850 and in 1900 celebrated, with appropriate ceremonies, the semicentennial of its incorporation. Under the charter of 1897, now in effect, the city is governed by a mayor elected for two years, and a city council. All heads of departments, excepting that of the school board, are selected by the mayor with the concurrence of the council. Town meetings are convened annually to levy road, bridge, and town taxes. The city owns and operates its waterworks and electric-light plant. Population, in 1890, 20,484; in 1900, 23,286.

BLOOMINGTON. A city and the county-seat of Monroe County, Ind., 50 miles southwest of Indianapolis; on the Chicago, Indianapolis and Louisville Railroad (Map: Indiana, C 3). It is the seat of the Indiana State University (q.v.). The city has vast quarrying interests, principally of limestone, and manufactures of furniture, hubs and spokes, leather, etc. It was settled about 1818. The government, under a general State law, is administered by a mayor, elected every four years, and a municipal council. Population, in 1890, 4018; in 1900, 6460.

BLOOMS'BURG. A town and county-seat of Columbia County, Pa., 40 miles southwest of Wilkesbarre; on the Susquehanna River, the Pennsylvania Canal, and the Lackawanna, the Philadelphia and Reading, and the Bloomsburg and Sullivan railroads (Map: Pennsylvania, E 2). It is the seat of a State normal school, and has fine county and town buildings. The city is in a region which produces iron, and contains, among its industrial establishments, iron furnaces and foundries; car works; flour, woolen, silk, and lumber mills; carriage, furniture, desk, and carpet factories, brass-works, etc. Population, in 1890, 4635; in 1900, 6170.

BLOT IN THE 'SCUTCHEON, A. The title of a tragedy by Robert Browning (1843), played by Lawrence Barrett in America. It is based upon the fatal consequences of a childish passion, uselessly concealed.

BLOUET, blōō'ā', PAUL. See O'RELL, MAX.

BLOUNT, blŭnt, SIR FREDERICK. A lisping character in Bulwer's play, *Money*. He pays nonchalant addresses to Georgiana Vesey and her £10,000.

BLOUNT, HARRY ('Unnurtured Blount'). The page in Scott's poem *Marmion*.

BLOUNT, WILLIAM (1744-1800). An American politician, born in Bertie County, N. C. He was a member of the North Carolina Legislature for several terms after 1780, of the Continental Congress in 1783-84, and again in 1786-87, and of the Constitutional Convention of 1787. In 1790 he was appointed by Washington to be Governor of "The Territory of the United States South of the Ohio" (including the present Tennessee), and soon afterwards founded the city of Knoxville. When Tennessee was admitted to the Union, in 1796, Blount was elected to the United States Senate from that State; but in July, 1797, he was detected in a conspiracy to wrest New Orleans and the Floridas from the Spaniards on behalf of Great Britain, and was summarily expelled on a charge of "high misde-

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meanor entirely inconsistent with his public trust and duty." The pro-British scheme caused much excitement at the time, both in and out of Congress, and has since been known as 'Blount's Conspiracy.' His formal trial was postponed until 1798, and early in 1799 the Senate decided to dismiss the impeachment on account of a lack of jurisdiction, Blount not then being a member. The whole incident increased considerably Blount's popularity in Tennessee, and soon after his expulsion he was elected to the State Senate, over which he presided for some time. Consult an article by Mrs. M. J. Lamb, in *Magazine of American History*, Vol. XIII. (New York, 1884).

BLOUSE, blouz (of uncertain origin). A name borrowed from the French for the loose, sack-like over-garment which, as worn in England by wagoners and farm laborers, is called a smock-frock. The English smock-frock is made of coarse and unbleached linen, sometimes plaited and embroidered. In Germany it is frequently tightened to the body by a belt, and is sometimes made of coarse woolen. France is preëminently the country of blouses. There they are worn universally by the laboring classes in towns, and so characteristic is this garment that the French populace are often called the 'Blouses.' The *white* blouse is a Sunday dress with the working classes in France, and has often served as a countersign among the leaders of sections in secret societies.

BLOW, blō, JOHN (1648-1708). An English composer and musician; born (probably) at North Collingham (Nottinghamshire). He was trained in music as one of the children of the Chapel Royal under Capt. Henry Cooke. In 1669 he was appointed organist of Westminster Abbey, and in 1685 composer-in-ordinary to James II. From 1687 to 1693 he was master of the choristers at Saint Paul's Cathedral, and in 1699 became composer of the Chapel Royal. He published *Lessons for the Harpsichord* (1698) and a collection of songs entitled *Amphion Anglicus* (1700). His other works, mostly unprinted, comprise fourteen services, about a hundred anthems, sacred songs, and many odes, including the setting for Dryden's ode on the death of Purcell (1695).

BLOWFLY. See FLESH-FLY.

BLOWGUN. A weapon used both for war and hunting by the tribes formerly inhabiting the Gulf region of the United States, by the natives of equatorial South America, and by the Malays of the East Indies. It consists of a straight tube from eight to twelve feet in length, from which a light arrow is forcibly expelled by the breath. The tube is made of a hollow reed or cane, the joints of which have been bored or burned through, or from two pieces of wood hollowed out and fitted together in flute fashion. In South America the arrow is usually tipped with poison, so that a slight scratch will produce death or paralysis. Among the Cherokees the arrow is feathered with thistle-down, put on so as to fill the bore of the tube.

BLOWING-MACHINES. Mechanical contrivances for producing an artificial current of air, often of considerable intensity. For the purpose of description, blowing-machines may be divided into the following classes or types: (1) bellows; (2) piston blowers; (3) fan blowers; (4) rotary blowers; (5) jet blowers.

BELLOWS. Some form of bellows was probably the earliest form of blowing-machine. A very primitive form of bellows is still in use in some Eastern countries, consisting simply of the skin of some animal sewed into a rude bag, with a valve and nozzle. The older forms of domestic bellows are all constructed on the same principle—viz. a chamber formed of two boards with flexible leather sides, having at one end a nozzle with a narrow mouth; and in the lower board a valve of considerably larger area for the admission of air. When the bellows are distended by drawing the boards apart, air is sucked in by the valve, to replace the vacuum which would otherwise be formed, and then, when the boards are being closed, the valve, which only opens inward, is shut by the compressed air; and the latter, having no other escape, is forced out at the nozzle. The great fault of the common bellows is that it gives a succession of puffs and not a continuous blast. A former remedy for this was to use two bellows, so that one was blowing while the other was filling; but it was afterwards found that the double bellows secured a still more uniform blast. This machine is merely the common bellows, with a third board of the same shape as the other two placed between them, so as to form two chambers instead of one. The middle board is fixed, and both it and the lower one have valves placed in them opening inward. A weight on the lower board keeps the under chamber filled with air; and when this board is raised by a lever or otherwise, the air which it contains is forced into the upper chamber. The exit-pipe is attached to the latter, and a weight is placed on the upper board sufficiently heavy to press the air out in a continuous stream, the continuity being maintained by the large quantity of air always present in the upper chamber, and the uniform pressure of the weight. Sometimes a spring is used instead of a weight to press out the air. This is the usual construction of the ordinary blacksmith's bellows. Even with the double bellows, however, the constant refilling of the upper portion from the lower prevents the blast from being quite regular, and its use is therefore limited to such simple requirements as are furnished by blacksmiths' forges and domestic fireplaces.

PISTON BLOWERS. The Chinese bellows is one of the earliest and simplest forms of piston blowers. It consists of a square chamber of wood, with a close-fitting piston, which, when drawn back, sucks air in through a flap valve like the ordinary bellows-valve, and when pushed forward compresses this air and forces it out through a nozzle. The modern form of piston blower is virtually an air-pump or compressor for producing low pressures. (See AIR-COMPRESSORS.) Its most extensive use is for supplying the air-blast to blast-furnaces, Bessemer converters, etc. Steam is the power most commonly used; but gas-engines have recently been introduced, and any other power, such as a fall of water, may be employed. A blowing-engine of modern construction usually consists of a steam-cylinder and an air-cylinder set tandem, either vertically, one above the other, or horizontally, one ahead of the other, with a common piston-rod and a heavy fly-wheel to regulate the operation. The air-cylinder is usually placed uppermost in a vertical engine and foremost in a horizontal engine, and the air is usually compressed

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on both the forward and the return stroke of the piston. Often the steam-cylinders are compounded. The air from the air-cylinder passes sometimes into a receiver, but more often directly into the blast-pipes, which are made large enough to act as a receiver or reservoir for maintaining a steady supply of air to the furnaces.

The following are brief descriptions of a number of representative modern blowing-engines: A blowing-engine built for the Hernadthaler Iron-Works at Krompach, Hungary, in 1898, is a horizontal cross-compound engine, with a high-pressure steam-cylinder 35 inches in diameter, a low-pressure cylinder 54 inches in diameter, and an air-cylinder 76 inches in diameter, all with a stroke of 55 inches. The contract with the builders required that this engine should have a capacity of 28,250 cubic feet of air at 10 pounds pressure, with a steam-pressure of 112 pounds, and making 52½ revolutions per minute. Among the more important vertical blowing-engines are those for the Dominion Iron and Steel Company of Sydney, Cape Breton, Canada, to supply the blast for the five blast-furnaces built in 1900. These engines have high-pressure steam-cylinders 50 inches in diameter, low-pressure steam-cylinders 96 inches in diameter, air-cylinders 96 inches in diameter, and a piston-stroke of 60 inches.

The largest gas-engine blower ever built is that constructed by the John Cockerill Company, of Seraing, Belgium, and exhibited at the Paris Exposition of 1900. This engine is of 600 horse-power; the gas-cylinder is 51.2 inches in diameter, with a piston-stroke of 55.1 inches; the air-cylinder is 66.9 inches in diameter, with a piston-stroke of 55.1 inches, and the engine is horizontal, with the air-cylinder ahead of the power-cylinder.

Disk Blowers. Disk blowers consist of an axle carrying several blades arranged something like the blades of a screw propeller and revolving concentric with and inside of a cylindrical casing open at both ends. This form of blower is used chiefly for ventilating purposes,

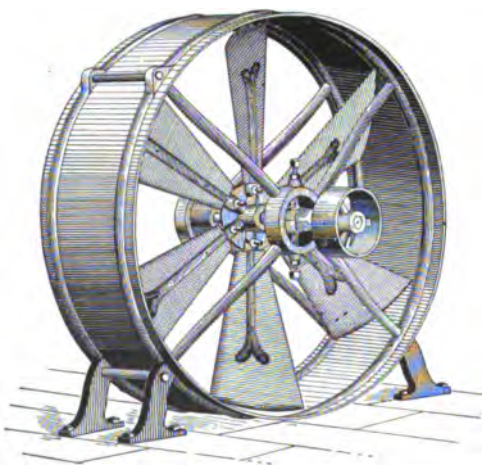

Fig. 1. Disk Blower.

and in such cases is set in the wall of a building with one end of the cylindrical casing opening into the building and the other end opening to the outside air. In this position the axle and blades are rotated by means of an electric motor or belt, and by means of this rotation suck or force the vitiated air from the room into the outer atmosphere. By setting the blower so that it faces into the building, fresh air from the outside may be forced into the room instead of the foul air being drawn out. The familiar 'electric fan' is a form of disk blower. Disk blowers are built of varying sizes, from 1 foot to 8 feet in diameter, and have a capacity of from 1500 cubic feet to 90,000 cubic feet of air per minute, depending upon their size and the speed at which they are run.

Fans. Fans are a form of rotary blower, something like a disk blower, except that the axle carries radial arms or spokes, to the ends of

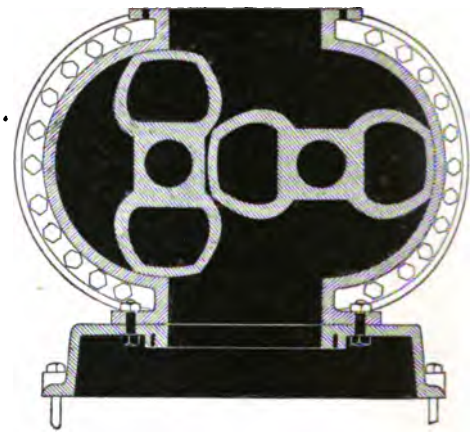

Fig. 2. Positive Blower.

which are fastened flat blades parallel to the axle. These blades revolve inside a chest or casing so arranged that the air is sucked in through circular orifices at the sides and is expelled through an outlet in the periphery. Several modern forms of rotary fan blowers have curved blades instead of flat paddles, as described above.

Positive Blowers. A recent form of rotary blower much used is the positive blower, of which the Root blower, shown in Fig. 2, is the most familiar form. This blower consists of two encased 'revolvers,' shaped something like a figure 8 and carried by two horizontal shafts, which are connected by gear-wheels outside of the casing, so that their relative motion is invariable. These 'revolvers' fit the casing closely, and also mesh closely with each other when revolving. As is clearly shown by the engraving, the air is taken in at the bottom of the casing and forced out at its top. These blowers are capable of developing considerably greater pressure than fans or disk blowers.

Jet Blowers. A jet of steam or of water forced through a pipe of small diameter inserted in an air-pipe of larger diameter, open at both ends, creates a current of air through the air-pipe in the direction of the escaping jet, which is often used for blowing purposes. The most familiar forms of steam-jet blowers are the exhaust nozzles used in the smokestacks of locomotives and fire-engines. In these instances the exhaust steam from the engine-cylinders is employed to furnish the steam-jet. A water-jet blower, called a *trompe*, was frequently used in the early days of metallurgy to furnish the blast for iron-furnaces. In this device a stream or jet of water

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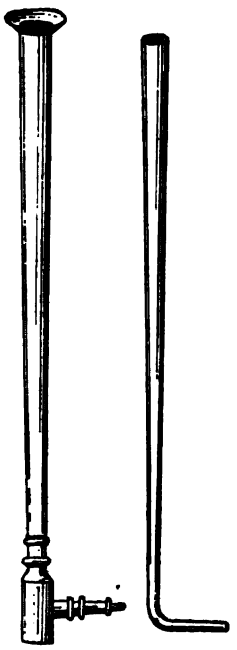
fell downward through a vertical pipe having openings for the admission of air at its top, and terminating at its bottom in an air-tight reservoir. The air sucked in at the top of the pipe by the falling water rises to the top of this reservoir from which it is piped off for use, while the water remains at the bottom and is drawn off by suitable valves or openings. There are various other forms of blowing-machines; but they are of such limited application, or have become so nearly obsolete, that they need not be described here. The modern blowers of greatest importance in mechanical operations are the bellows, the blowing-engine, and rotary blowers of the fan, disk, and positive types. See HEATING AND VENTILATION.

BLOWITZ, blō'vitz, HENRI GEORGES STEPHANE ADOLPH OPPER DE (1832—). A French journalist. He was born at Blowitz, Pilsen, Bohemia, but early removed to France, where he was for many years a teacher of languages at Tours, Limoges, and Marseilles. During this time he became known as a writer on European politics, contributing to the *Gazette du Midi* and other journals. He was naturalized as a French citizen in 1870 and became a warm supporter of Thiers, and for his services in aiding in the suppression of the Commune at Marseilles in 1871 was decorated with the cross of the Legion of Honor. In July, 1871, he began his long career as Paris correspondent of the *London Times*. His services on the *Times* have been noteworthy, in particular his revelation, in 1875, of the plans of the German military party for the second invasion of France, and his publication of the entire text of the Treaty of Berlin before it was signed. He was one of the first newspaper men to see the value of the 'interview.' Besides having contributed over 4000 columns to the *Times*, he has published *Feuilles volantes* (1858); *Midi à quatorze heures*, a comedy; *l'Allemagne et la Provence* (1869); *Le mariage royal d'Espagne* (1878); *Une Course à Constantinople* (1884).



BLOWPIPES.

BLOWPIPE. A conical tube of metal terminating in a small opening, and used in the arts for soldering metals, and in mineralogy and analytical chemistry for determining the nature of substances. According to Berzelius, Anton von Swab, a Swedish counsellor of mines, first used the blowpipe in 1738 to test minerals and ores. Its use extended from Sweden to Germany, and thence throughout the Continent of Europe and to England. Cronstedt, Bergman, Gahn, and Berzelius have successively introduced valuable improvements in the form of the blowpipe. The present form, however, is due to Plattner and his successors in the Royal Saxon Mining Academy in Freiberg.

The blowpipe commonly used in analytical work consists of a conical brass tube about 8 inches long, terminating at the wider end in a convenient mouthpiece, of horn or rubber, while at the lower end a small tube with a finely perforated nozzle and a platinum tip is inserted at right angles to the larger tube slightly above its end, the space below being intended as a chamber projected in a lateral direction as a long, pointed cone; the air thus supplied being sufficient for the moisture from the breath.

When the nozzle of the blowpipe is placed within an ordinary flame and a somewhat strong current of air is blown through it, the flame is projected in a lateral direction as a long, pointed cone; the air thus supplied being sufficient for complete combustion, the flame is colored blue and is very hot. If the point of this flame is directed against metals, the latter are rapidly transformed into their oxides, and hence the flame is called an *oxidizing flame*. On the other hand, when the nozzle of the blowpipe is placed near but outside a flame, and a gentle current of air is blown through it, the flame retains its luminosity, and, owing to the presence in it of incandescent carbon, is capable of reducing oxides to the metallic state; whence the name, *reducing flame*. See also FLAME.

In certain tests the substance is heated before the blowpipe on a piece of charcoal, the formation of colored coatings often indicating the nature of the compound; thus, lead deposits on the charcoal a yellow coating of its oxide. In other tests the substance examined is mixed with reagents, usually borax, sodium carbonate, microcosmic salt, and cobalt nitrate. The first four of these form, with metallic oxides, colored glass-like beads which serve to determine the composition of the substance. With borax, a bottle-green glass bead is obtained when iron salts are present; an amethyst-colored bead indicates manganese, and a blue-colored bead, cobalt. Sodium carbonate and microcosmic salt also yield characteristic colored beads that serve to indicate the presence of certain ingredients. The solution of cobalt nitrate, when applied to a powder on a piece of charcoal, yields characteristic colors for certain compounds that are distinctive, notably the blue coloration for aluminium salts.

Blowpipe analysis is generally used for qualitative determinations, and finds its greatest application in field-work as an easy means for determining the composition of minerals. In certain cases, it is possible to make also a quantitative estimation of ores, especially those of silver and lead, by the use of the blowpipe. But the insignificant quantity of the material employed renders the results scarcely precise enough even for the purposes of technical analysis.

The blowpipe is the common instrument used by goldsmiths and jewelers for soldering metals. It is also used by glass-blowers in their work, but in their manipulations the form of the blowpipe is usually the Bunsen blast-lamp, in which the heat of the gas-flame is increased by a current of air that is supplied from a bellows.

Consult: H. B. Cornwall, *Manual of Blowpipe Analysis, Qualitative and Quantitative, with a Complete System of Determinative Mineralogy* (New York, 1891); C. F. Plattner, *Manual of Qualitative and Quantitative Analysis with the Blowpipe*, trans. Cornwall (New York,

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1892); W. A. Ross, *The Blowpipe in Chemistry, Mineralogy, and Geology* (London, 1889); and Moses and Parsons, *Elements of Mineralogy, Crystallography, and Blowpipe Analysis from a Practical Standpoint* (New York, 1895). See ANALYSIS, CHEMICAL.

BLÜCHER, blük'er, GEBHARD LEBERECHT VON, Prince of Wahlstadt (1742-1819). A Prussian field-marshal. He was born at Rostock, in Mecklenburg-Schwerin, December 16, 1742. At the beginning of the Seven Years' War he joined a regiment of Swedish hussars, and in his first action was taken prisoner by the Prussian hussars, whose colonel persuaded him to enter the Prussian service and gave him a lieutenancy. Another lieutenant having been promoted over Blücher's head, the latter immediately wrote to Frederick the Great as follows: "Von Jägersfeld, who has no merit except that of being the son of the Margrave of Schwedt, has been put over my head. I beg to request my discharge." Blücher was put under arrest and after repeated applications for discharge, he received from Frederick the curt intimation: "Captain Blücher is at liberty to go to the devil!" Blücher betook himself to his estate at Gross-Raddow, in Pomerania, and devoted himself to farming, but soon tired of bucolic life, and in 1787 rejoined the army. He fought as colonel of hussars against the French on the Rhine, evincing great ability as a leader of cavalry. In the campaign of 1806 he took part as lieutenant-general in the battle of Auerstädt. Blücher, with the greater part of the cavalry, covered the retreat of the Prince von Hohenlohe through Pomerania. He was accused of not giving the Prince due support, and thus causing the capitulation at Prenzlau. Blücher marched into the territory of the free town of Lübeck, and hastily fortified the city; but the French took it by storm, and he was forced to surrender on the plain of Ratkow, near Lübeck, whither he had escaped with a few troops. A fortnight later he was exchanged for the French General Victor, and immediately on his arrival in Königsberg was sent at the head of a corps to assist in the defense of Stralsund. After the Peace of Tilsit he was employed in the War Department in Königsberg and Berlin, and subsequently became commandant of Pomerania. At a later period he was placed on the retired list, together with several other men of note, at the instance, it was said, of Napoleon. He was one of the few to combat the general belief in the invincibility of Napoleon, which had grown into a sort of fatalism in high places. In common with Stein and Hardenberg, he labored to remove all weak and unpatriotic counselors from about the King. When all the leaders of the army lost courage, his constancy revived confidence and made him the centre of all hope for the future. When his countrymen at last rose against the French in 1813, Blücher was appointed to the chief command of the Prussians, reinforced by General Winzingerode's Russian corps. At the battles of Lützen, Bautzen, and Haynau, he displayed heroic courage. At the Katzbach he defeated Marshal Macdonald and cleared Silesia of the enemy. In vain did Napoleon himself attempt to stop the "old captain of hussars," as he called him, in his victorious career. In the battle of Leipzig he won a great advantage over Marshal Marmont, at Möckern, October 16, 1813, and on the same day pressed on to the suburbs of the city. On the 18th, in conjunction with the Crown Prince of Sweden, he had a large share in the defeat of the French, and on the 19th his troops were the first to enter Leipzig. Opposing the policy of Austria, Blücher insisted that the taking of Paris was the end to be sought. On the first day of January, 1814, he crossed the Rhine, garrisoned Nancy on the 17th of the same month, and after winning the battle of La Rothière, pressed forward toward Paris. But his scattered corps were routed by Napoleon, and he fought his way back to Châlons with great loss. On March 9, however, he defeated Napoleon at Laon; and at the end of the month, after being joined by Schwarzenberg and his corps, he again advanced toward Paris. The day of Montmartre crowned the brilliant deeds of this campaign, and on March 31 the Allies entered the French capital. Blücher himself, who was suffering from a malady of the eyes, abstained from entering the city on that day. Frederick William III. created him Prince of Wahlstadt, in remembrance of the victory at the Katzbach, and gave him an estate in Silesia. In England, whither he followed the allied sovereigns, he was received with an enthusiasm never before excited by a German. The University of Oxford conferred on him the degree of doctor of laws. After Napoleon's return from Elba, in 1815, Blücher once more assumed the general command, and promptly led an army into the Netherlands. On June 16, 1815, he lost the battle of Ligny, and narrowly escaped being killed by his horse falling on him. The victory of the Allies in the battle of Waterloo was decided by Blücher's timely appearance on the field. He ordered his Prussians to pursue the flying enemy, which they did the whole night. Declining the offered truce, Blücher marched against Paris, and on the second taking of that city manifested a strong desire to retaliate on Paris the spoliation that other capitals had suffered at the hands of the French; but he was held in check by the Duke of Wellington. In order to reward Blücher's services to Prussia and the common cause, Frederick William III. created the Order of the Iron Cross, the badge of which consisted of an iron cross surrounded by golden rays. On August 26, 1819, a colossal bronze statue was erected in his honor in his native town. Blücher died September 12, 1819, after a short illness, at his estate of Krieblowitz, in Silesia. Consult: Scherr, *Blücher, seine Zeit und sein Leben* (Leipzig, 1887); Varnhagen von Ense, "Fürst Blücher von Wahlstadt," Vol. III. of the *Biographische Denkmale* (Leipzig, 1872); von Colomb, *Blücher in Briefen aus den Feldzügen, 1813-15* (Stuttgart, 1876).

BLUDOFF, blōō'dôf, DIMITRI NIKOLAYEVITCH Count (1785-1864). A Russian statesman, born in the Government of Vladimir. He studied in Moscow, entered the diplomatic service, was appointed Secretary of State under Nicholas I., and in 1832 became Secretary of the Interior. He worked unceasingly for the welfare of the peasants. As Minister of Justice he obtained two ukases (1842, 1847) for the amelioration of the condition of the serfs, and as president of the Imperial Council and of the Council of Ministers he set his signature to the act abolishing serfdom. For his biography, consult Kovalevski (Saint Petersburg, 1866).

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BLUE (from Fr. *bleu*, in itself borrowed from the Germanic nations; OHG. *blāo*, AS. *blōw*, Ger. *blau*). A primary color of the same shade as the clear sky and the turquoise, and located in the solar spectrum after the green and before the violet. This color has been conspicuously used as a badge to designate military bodies. It was the favorite color of the Scottish Covenanters in the Seventeenth Century, when it was called 'true blue,' and is the color commonly worn by the soldiers of the United States Army. The sailors of most navies are dressed in uniforms of a darker color, called *navy blue*. Among blue minerals, the sapphire and the turquoise are highly valued as gems; the lapis-lazuli has been extensively used for ornamental purposes. The coloring matter of blue flowers is due to a pigment called *anthocyanin*. Among the more important blue pigments are the following: *Antwerp blue*, a mixture of Prussian blue and alumina; *azure blue*, a cobalt oxide fused with glass and ground to powder; *Berlin blue*, another name for both Antwerp blue and Prussian blue; *Bice blue*, originally native azurite powdered and washed, more commonly, however, a preparation of smalt; *Bremen blue*, chalk or whiting mixed with a solution of copper in nitric acid; *China blue*, crude cobalt oxide ground with potash and mixed with feldspar, fused, and powdered; *cobalt blue*, 10 parts of alumina mixed with 1 part of a cobalt salt, slowly dried, and heated to a dull redness and ground to powder; *King's blue*, a cobalt carbonate; *mountain blue*, native copper carbonate or azurite; *mineral blue*, a synonym for Antwerp blue; *Paris blue*, a synonym for both cobalt blue and Prussian blue; *Prussian blue* is iron ferrocyanide made by adding potassium ferrocyanide to a solution of ferrous sulphate, and the resulting precipitate washed and dried; *Queen blue*, a synonym for lump blue used in laundries (bluing); *Saunders blue*, ultramarine ashes obtained from the resinous mass in making ultramarine; *Saxon(y) blue*, Prussian blue and aluminium hydrate; *smalt*, a cobalt ore heated with flint and potash, and ground to a powder; *Thénard blue*, a synonym for cobalt blue; *ultramarine*, originally prepared from lapis-lazuli, but now made synthetically by heating together kaolin, sodium sulphate, sodium carbonate, sulphur, and charcoal, then pulverizing, washing, and drying. Among the dyestuffs that yield a blue color are the following, the origin of many of which is indicated by their names: *Alzarin blue; aniline blue; anthracene blue; chemic blue*, a solution of indigo; *Coupier's blue*, derived from induline; *dahlia blue*, derived from rosaniline; *ethylene blue*, derived from diethylaniline; *indigo blue*, originally derived from the indigo plant and now made synthetically; *logwood blue*, an extract of logwood; *methylene blue*, derived from methylaniline; *night blue*, derived from rosaniline; *resorcine blue*, derived from phenol; *soluble blue*, derived from rosaniline; and *Victoria blue*, derived from rosaniline.

Blue Stone, or *Blue Vitriol*, is the commercial name for copper sulphate.

BLUE, VICTOR (1865—). An American naval officer, born in North Carolina. He graduated at the United States Naval Academy at Annapolis in 1887, served on the *Suwanee* in the Spanish-American War, and attracted general attention in June, 1898, by penetrating seventy-two miles within the Spanish lines in the vicinity of Santiago, Cuba, and definitely determining for the first time the presence of the Spanish fleet in Santiago Harbor. After the battle of Santiago he was placed in command of the *Alvarado*, a gunboat captured from the Spanish, and on August 12, 1898, participated in the attack upon the Spanish batteries at Manzanilla. In 1900 he served as flag-lieutenant on the staff of Rear-Admiral Kempff during the Boxer disturbances in China, and subsequently was assigned to duty in the Philippines.

BLUE AND THE GRAY, THE. A well-known poem by Judge Francis Miles Finch (1867), published in the *Atlantic Monthly*, and based on the decoration of the graves of Federal and Confederate soldiers in a Southern cemetery.

BLUEBACK. The name of various fishes having bluish backs; specifically, the Fraser River salmon (*Oncorhynchus nerka*), of the northwest coast of America. See SALMON.

BLUEBEARD. A fictitious hero of the familiar tale which in the Eighteenth Century found its way into English from the French of Charles Perrault (c.1697). In this story, the Chevalier Raoul, whose surname is due to the color of his beard, had married seven wives. Six of these had mysteriously disappeared, and the seventh is represented as subjected to a singular test of obedience. Having occasion to go away, Raoul commits to Fatima the keys of his castle, and enjoins her that, though she may otherwise have free course, she must not open a certain chamber. Her curiosity is enhanced by her loneliness, and proves too strong for her. Opening the door, she beholds the charnel-house, where lie the bones of her predecessors. Her lord returns, discovers her disobedience by the blood upon the key, and tells her that in five minutes she must die. From the top of the castle, however, her sister Anne observes horsemen approaching in the distance, who are the brothers of the ill-fated wife, and they arrive just in time to rescue their sister by slaying Bluebeard. Though Bluebeard is imaginary, there is thought to be a historic prototype in Gilles de Laval, Baron de Retz (1396-1440). He fought like the brave man he was against the English in their invasion of his country; but his intrepidity pales before his diabolical cruelties, and it is by these that he is remembered. Because of some disloyalty to the Duke of Brittany, he was burned alive near Nantes in 1440. That Laval is the original of Bluebeard is conjecture at best, and from the fact that the story is found with more or less variety of detail in the folklore of different peoples, this doubt is enhanced.

Besides the French version of Perrault, there are tales of a similar kind in Straparola's *Piacevoli notti* (1569), and in the *Pentamerone* of Gian Alesio Abbatutis. There is at Marbihan an interesting pictorial representation in some frescoes of the Thirteenth Century, mentioned by Violeau in his *Pélerinages de Bretagne*. And it has been pointed out that the resemblance is very close to the Arabian Nights' tale of the Third Calendar. In his *Phantasus* Tieck has wrought the matter into a clever drama; Grétry has, in his *Raoul Barbe-Bleue* (1789), given it the setting of comic opera; Offenbach produced

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lent quality upon good soils, does not yield a large quantity, and on this account it is less valuable for hay than as a pasture and lawn grass. For these purposes it is not surpassed by any other grass in regions adapted to its growth. It is a perennial, attaining a height of from a few inches to two feet, with an abundance of long, narrow, soft root-leaves. It spreads with rapidity by means of its rootstocks, soon forming a dense sod. On this account it stands pasturing well, the ordinary tramping of stock not injuring it to any extent. Blue grass should enter into every mixture for permanent pastures in the eastern and middle United States. The seed, as marketed, usually contains much chaff and is of low vitality; hence it should be sown rather thickly. To make a good firm sod, about three years are required, after which little attention is necessary. Pastures more than sixty years old are still in good condition. This grass does not do well in the warmer parts of the Southern States. In the South, the Texas blue grass, *Poa arachnifera*, replaces it. This species is closely related to the Kentucky blue grass, differing from it principally in its more vigorous growth and having its 'seed' more or less covered with wool. This grass is propagated by seed or by setting out portions of sods, the woolly seed making sowing difficult. It spreads rapidly, and promises to become one of the best grasses for the regions to which it is adapted. Texas blue grass withstands drought better than the former species. There are a number of other species of *Poa* that resemble these blue grasses, and some of them may prove especially adapted to regions where the others are not suited. Kentucky blue grass has the following percentage composition: Water, 65.1; proteid matter, 4.1; fat, 1.3; nitrogen-free extract, 17.6; crude fibre, 9.1; mineral matter, 2.8. Its feeding value, like that of other grasses, depends chiefly on its nitrogen-free extract, crude fibre, and protein content. It is a wholesome and nutritious feed, relished by all kinds of stock. Hay made from this grass, cut when the seed is in the milk stage, contains, on an average per cent., water, 24.3; proteid matter, 6.3; fat, 3.6; nitrogen-free extract, 34.3; crude fibre, 24.5; and mineral matter, 7.0. Hay made from grass cut when the seed is ripe contains, on an average, a little less nutritive material. As regards composition, it compares favorably with hay and other grasses.

BLUE-GRASS REGION. A beautiful section of the State of Kentucky, famed for its trotting horses and blooded stock. The soil is specially adapted to the cultivation of hemp and tobacco.

BLUE-GRASS STATE. Kentucky. See STATES, POPULAR NAMES OF.

BLUE-GREEN ALGÆ. See CYANOPHYCEÆ.

BLUE-HEN STATE. Delaware. See STATES, POPULAR NAMES OF.

BLUE ISLAND. A city in Cook County, Ill., 2½ miles south of the city limits of Chicago, on the Calumet River and on the Illinois Central, the Chicago, Rock Island and Pacific, the Chicago and Grand Trunk, and the Chicago and Calumet Terminal railroads (Map: Illinois, E, 2). It is a popular suburb of Chicago, is an important railroad and commercial centre, and has brick-yards, stone-quarries, breweries, oil-works, smelting-works, etc. Settled in 1833, Blue Island was incorporated as a village in 1872. It was the storm-centre in the early phase of the great railway strikes of 1894, which tied up the traffic of half the country and led to the sending of United States troops to Chicago and elsewhere. The government is administered under a charter of 1901, which provides for a mayor, biennially elected, and a city council. The water-works and electric-light plant are owned and operated by the municipality. Population, in 1890, 3329; in 1900, 6114.

BLUE JAY, SHARK, TIT, etc. See the substantives.

BLUE KNIGHT, THE. Sir Persaunt of India, the fourth of the brothers, the Black, Red, Green, and Blue Knights. Sir Beaumains, or Gareth, conquers him in chapter 131 of Malory's *Morte d'Arthur*. He is spoken of as 'The Blue Knight' in chapter 133.

BLUE LAWS. A name given to certain enactments supposed to have been made by the New Haven Colony, in Connecticut, in the early days of the settlement. The supposition is based upon the fact that, as usual, in the Puritan days the personal conduct of citizens was often subject to judicial supervision and animadversion, and Sabbath-breaking was especially odious to the magistracy. A Tory minister, the Rev. Samuel A. Peters, who had charge of the English churches in Hartford and Hebron, but who was compelled by the Revolution to flee to England, published there, in 1781, what purports to be a *General History of Connecticut*, a work whose exaggeration and spite make it almost a curiosity. Many years ago a small book containing these supposed laws, which were really extracts from Peters's history, was published, and is even now referred to as authority by the unsuspicious. These laws were formerly supposed to have been invented out of hand by Peters, and to have had no existence in fact; but recent investigations have shown that, although many of them are not to be found in the New Haven statute-books, all except two or three out of the forty-five are to be found either in the works of an earlier writer (Neal) or, with slight modifications, in the statute-books of the various New England colonies. Consult: an article "An Examination of Peters's Blue Laws," by W. F. Prince, in the *Annual Report of the American Historical Association* for 1898; and J. H. Trumbull, *True Blue Laws of Connecticut and New Haven; and the False Blue Laws Invented by Rev. Samuel Peters* (Hartford, 1876).

BLUE LAWS OF HAWAII, a compilation of Hawaiian statutes, largely of a paternal character, promulgated in 1840 by Kamehameha III. These laws were due to missionary influence, and were obnoxious to the native population of the islands because of their interference with the ancient customs and habits of the people. They were republished in 1894 under the title of Hawaii's *Blue Laws*.

BLUE LIGHT, BENGAL LIGHT, or BENGAL FIRE. A brilliant signal-light used at sea to attract attention, give warning, etc., and in ordinary pyrotechny for illuminating a district of country. It is prepared from nitre, sulphur, and the tersulphuret of antimony. The materials are reduced to fine powder, thoroughly

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dried, and intimately mixed in the following proportions by weight: nitre, 6; sulphur, 2; tersulphuret of antimony, 1. The mixture constitutes the blue light, and when kindled by a red-hot coal, red-hot iron, or flame, immediately bursts into rapid and vivid combustion, evolving a brilliant, penetrating, but mellow light, which, during the darkness of night, readily overcomes the gloom for a considerable space. As the fumes evolved during the combustion of the blue light contain an oxide of antimony, and are poisonous, the light cannot be used with safety in rooms or inclosed spaces.

BLUE LIGHT. In American political history, a name applied to a member of that faction of the Federalist Party (q.v.) which opposed the War of 1812. It was derived from the fact, or alleged fact, that when Decatur, with two frigates, was blockaded by a superior English fleet in the harbor of New London, Conn., in 1813-14, certain Federalists warned the English commander by burning blue lights at the entrance of the harbor each time the Americans attempted to get to sea under cover of darkness.

BLUE MANTLE (so named from the color of his robe). The title of an English pursuivant-at-arms. See PURSUIVANT.

BLUE MONDAY. A name originally referring to a custom in parts of Europe, especially in Bavaria, in the Sixteenth Century, of decorating churches in blue colors on the Monday preceding Lent, when the people celebrated the carnival festivities; but the excesses committed led to the legal abolition of the custom. In the United States it is a custom of some women of the poorer class to call every Monday by this name, as it is the general day for doing the hard laundry-work of the week.

BLUE MOUNTAINS. The name of several mountain chains in New South Wales, Australia, Jamaica, West Indies, and New Jersey and Pennsylvania. (1) The Blue Mountains of New South Wales run nearly parallel with the coast, and form a part of the complex Cordillera of Australia, which extends from Cape York on the north to Wilson's Promontory on the south. They are composed of horizontal sandstone strata broken by cañons and deep gullies, and present a precipitous front toward the east. The highest point of the Blue Mountains, Mount Beemarang, is about 4100 feet high. They are crossed by a railway which affords communication between Sydney and the rich pasturage and mining regions of the interior (Map: New South Wales, E 4). (2) The Blue Mountains of Jamaica traverse a considerable part of the length of the island, and attain an extreme altitude of 7400 feet. (3) The Kittatinny and the Shawangunk mountains forming the second ridge of the Appalachian Mountains in New York, Pennsylvania, and New Jersey are also called the Blue Mountains. These are to be distinguished from the Blue Ridge.

BLUE NILE. See NILE.

BLUE NOSE. A nickname for the Nova Scotians, from the effect of the climate, or from a kind of potato called 'Blue Nose' raised in that region.

BLUE PETER (*blue* + *'peter*, for *repeater*). A rectangular blue flag with a white centre of similar shape, but of about one-fourth of the dimensions. It is the letter 'P' of the international marine code (see SIGNALS, INTERNATIONAL); when hoisted alone at the fore (i.e. at the fore-truck, or top of the foremast) it signifies that the vessel will shortly sail, or is ready to sail. In the United States Navy a flag called the cornet takes the place of the blue peter as a sailing-signal.

BLUE PILL (*Pilula hydrargyri*). The most simple form in which mercury can be administered internally. It consists merely of two parts of mercury rubbed up with three parts of conserve of roses, till globules of mercury can no longer be detected; to this is added powdered licorice-root, so that a pill of five grains contains one grain of mercury.

In cases of torpid condition of the liver or inflammation of that organ, blue pill is much used as a purgative, either alone or combined with some other drug, such as rhubarb. As a saline purgative, the common dose of blue pill is one or two pills of five grains each, followed by a purgative draught, such as a Seidlitz powder. There is always danger of salivation, with the accompanying deterioration of gums and teeth, and the medicine should be taken only when ordered by a physician. It is recorded that a blue pill taken on each of three successive nights caused fatal salivation. Many proprietary purgative pills contain metallic mercury.

BLUE-RIBBON ARMY. The name adopted in England by a society of total abstainers, from the blue badge worn by the members. Since 1883 the society has been known as the 'Gospel Temperance Union.' The organization originated in America in 1878, where it was known from its founder as the Murphy Movement. See TEMPERANCE SOCIETIES.

BLUE RIDGE. The name of the most easterly range of the Appalachians in the United States (Map: United States, eastern part, K 3). It forms an almost continuous chain from West Point in New York (the Highlands) down to the north of Alabama, through New Jersey (Schooley's Mountain), Pennsylvania (South Mountain), Virginia, the Carolinas, and Georgia. In New Jersey and Pennsylvania the name of Blue Ridge is sometimes, but inaccurately, applied to the 'second' range, properly the Blue (or Kittatinny) Mountains, which runs parallel with this, and is separated from it by a part of the Great Valley. The Blue Ridge proper refers especially to that part of the range below Pennsylvania, which separates the Great Valley from the Piedmont Region. In south Virginia the range widens into a broad plateau, which reaches its widest extent in North Carolina, where it is intersected by numerous groups known as the Black, Cowee, Nantahala, and South mountains. These groups run transverse to the main axis of the Blue Ridge, and their valleys are occupied by numerous streams with a general northwesterly course. The Black Mountains include the highest summits of the range as well as of the Appalachians. Mount Mitchell, or Black Dome, the loftiest point, is 6710 feet, while Guyot's Peak, Sandoz Knob, Gibbe's Peak, and several others are over 6000 feet. Toward the north the Blue Ridge falls off in elevation; in Virginia the summits are about 4000 feet, and in Pennsylvania and New Jersey they are much less. The range is crossed by several large rivers flowing through narrow defiles or gaps, as the Hudson in its traverse of the Highlands, and the Potomac at

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Harper's Ferry. See APPALACHIANS; BLACK MOUNTAINS. Consult Whitney, *United States* (Boston, 1889).

BLUE RIVER, or **BIG BLUE RIVER.** A river rising in Washington County, Ind., flowing southwest and emptying into the Ohio River a few miles above Leavenworth. It has a course of less than 100 miles, but it affords some water-power. This name is also applied to the east fork of the White River. See WHITE RIVER.

BLUE SEA. See ARAL LAKE.

BLUE SICKNESS. See HOG-CHOLERA.

BLUE-STEM GRASSES. See ANDROPOGON.

BLUESTOCKING CLUB. A social gathering, probably an Anglicization of the Hôtel de Rambouillet movement of Seventeenth-Century France, which extended to England in the Eighteenth Century. The meetings, held at the houses of Mrs. Montague, Mrs. Vesey, and other literary women, were characterized by plainness of dress. One of the members, Mr. Benjamin Stillingfleet, is said to have habitually worn blue hose, and the wits were not long in dubbing the coterie 'The Bluestocking Club.' The name 'bluestocking' (*bas bleu*) has been applied since then to any woman who makes a pretense to learning. An interesting account of these meetings may be found in the *Memoirs* of Elizabeth Carter (London, 1816).

BLUE STRING, ROBIN. A name applied to Sir Robert Walpole, because of the blue ribbon of his decoration as a Knight of the Garter.

BLUE THISTLE, See VIPER'S BUGLOSS.

BLUETHROAT. A remarkable little European bird, allied to the robin (and hence sometimes called 'bluebreast' in England, where it is an infrequent visitor), assigned to the genus Cyanecula; and characterized by a bright-blue throat, separated from the white below it by crescentic bands of black and rust-red. Two species are known, one having a white spot in the centre of the blue (*Cyanecula leucocyanea*), and ranging from Barbary to Holland and Germany; and the other (*Cyanecula suecica*) with a brick-red fan-shaped patch in the midst of the blue. (See Colored Plate of SONG-BIRDS.) This latter species is highly migratory, spending its winters in tropical Africa and India, and going each summer to breeding-haunts in Scandinavia, northern Russia, Siberia, and western Alaska. One feature of this migration renders it extraordinary—namely, that the bird has almost never been seen in the countries intermediate between its summer and winter homes, so that apparently it makes the whole journey of not less than 1500 miles in a single flight, either at night or at an invisible altitude. (See MIGRATION.) The Alaskan visitors also cross Bering Strait twice annually, never migrating southward in America.

The bluethroat is known throughout northern Europe as the Swedish nightingale on account of its fine singing; and the Laplanders style it 'the bird of the hundred voices,' because of its remarkable powers of mimicry. Seebohm and Brown (*Ibis*, VI., 125, 1876) were greatly impressed by this power in Siberia, where it is exceedingly abundant in thickets and along stream-courses as far north as 71°, making its nest in bushes and weeds. They mention its imitating the trilling of the sandpiper, the rich song of the redwing, and various other birds. "Sometimes he runs these together in such a way as to form a perfect medley of bird-music." Consult the books on the ornithology of Europe, Siberia, and Alaska, mentioned under BIRDS.

BLUE VITRIOL. See COPPER.

BLUEWING. A duck. See TEAL.

BLUFF, COLONEL. The name of a character in *The Intriguing Chambermaid* (1734), by Fielding.

BLUFFTON. A city, the county-seat of Wells County, Ind., 25 miles south of Fort Wayne, on the Wabash River, and on the Lake Erie and Western and the Toledo, Saint Louis and Kansas City railroads (Map: Indiana, D 2). It has a considerable grain and lumber trade, foundry and machine shops, wind-pump factory, and manufactures of barrels, hoops, staves and headings, buck-handles, clay pottery, mittens, etc. Settled in 1837, Bluffton was incorporated in 1849. The government is administered by a mayor, elected every two years, and a municipal council. The city owns and operates its waterworks and electric-light plant. Population, in 1890, 3589; in 1900, 4479.

BLUHME, blōō'me, CHRISTIAN ALBRECHT (1794-1866). A Danish statesman, born in Copenhagen. He studied jurisprudence from 1811 to 1816, was appointed director of the general custom-house in 1843, and in 1848 Minister of Commerce. In 1851 he became Minister of Foreign Affairs. He took measures for the maintenance of Danish neutrality during the Crimean War, and having resigned in 1854, was brought to trial with the remainder of the ministry on the ground that the expenditures for national defense had been made without appeal to the Rigsdag. He was acquitted in 1856, and again in 1864-65 took charge of the portfolio of Foreign Affairs, and at the same time acted as president of the Council of the Ministry.

BLUHME, FRIEDRICH (1797-1874). A German jurist and judge. He was born in Hamburg, and educated in Göttingen, Berlin, and Jena. In 1833 he was appointed judge of the High Court of Appeal at Lübeck, and was professor successively at Halle (1823), Göttingen (1831), and Bonn (1843). His works include many valuable studies in Roman and German law, among them *Grundriss des Pandektenrechts* (1844), and *Encyklopädie der in Deutschland geltenden Rechte* (1847-58). The treatise "Die Ordnung der Fragmente in den Pandektentiteln" (*Zeitschrift für geschichtliche Rechtswissenschaft*, Vol. IV., 1820) explained the method followed in arranging the excerpts in Justinian's Pandects.

BLUING. A blue, soluble compound used in laundry-work to neutralize the yellow tinge of white clothes. Formerly a preparation of indigo, such as indigo and starch, was chiefly used, but more recently soluble Prussian blue or other soluble blue pigments, frequently made up into balls, have come into use.

BLUING OF METALS. See TEMPERING METAL.

BLUM, *Fr. pron.* blĕn, ERNEST (1836—). A French dramatist, born in Paris. He made his début as a writer at the age of sixteen with *Une femme qui mord.* As a journalist he has been associated with *Charivari*, *Rappel*, *Gaulois*, and other publications. Many

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of his dramatic works were written in collaboration with Clairville, Flan, Monnier, Brisbarre, Labiche, and others. Among the vaudevilles, librettos, and dramas of this versatile writer, the following are especially noteworthy: *Les noces de diable* (1862); *Rocambole* (1864); *La jolie parfumeuse* (1874); *Rose Michel* (1875); *Espion du roi* (1876); *Le petit chaperon rouge* (1885); *Les femmes nerveuses* (1888); *La rieuse* (1894); *Le carillon* (1897).

BLUM, blōōm, HANS (1841—). A German publicist and author, son of Robert Blum, born in Leipzig, and educated at the universities of Leipzig and Bern. He was a member of the North German Reichstag from 1867 to 1870 and from 1869 to 1897 a barrister in Leipzig. During the Franco-Prussian War he was in the field as correspondent for *Daheim*, and in 1871-79 edited the *Grenzboten*. His extensive and varied publications include works on contemporary politics, such as *Die Lügen unserer Socialdemokratie* (1891), contributions to history in *Fürst Bismarck und seine Zeit* (1894-95); *Das erste Vierteljahrhundert des deutschen Reichs* (1896), and other volumes, some fiction, two dramas, and *Persönliche Erinnerungen an den Fürsten Bismarck* (1900).

BLUM, ROBERT (1807-48). A German patriot. He was born in very humble circumstances in Cologne, November 10, 1807, and after a brief military service in 1830, became scene-shifter, and afterwards secretary of a theatre in Cologne, and subsequently in Leipzig. In this situation he remained, devoting his leisure time to literature and politics until 1847, when he established himself as a bookseller and publisher. In 1840 he founded in Leipzig the *Schillerverein*, which celebrated the poet's anniversary, as a festival in honor of political liberty. In 1845 he acquired great reputation as a popular orator in connection with the German Catholic movement, and particularly through his action at a turbulent meeting of armed citizens and students of Leipzig, whom he dissuaded from storming the barracks. He became the champion of the Liberal Party of Saxony on the outbreak of the Revolution of February, 1848, and was elected vice-president of the Preliminary Parliament at Frankfort. In the National Assembly he became leader of the Left; and was one of the bearers of a congratulatory address from the Left to the people of Vienna when they rose in October. In Vienna he joined the Students' Corps, was arrested, and shot on November 9. Blum was a man of strong intelligence and great oratorical power. Consult Hans Blum, *Robert Blum* (Leipzig, 1878).

BLUM, blŭm, ROBERT FREDERICK (1857—). An American painter, born in Cincinnati, Ohio. He studied at the Academy of Fine Arts, Philadelphia, Pa., and exhibited in New York City in 1879. Among his works are "Going and Coming" (1881); "Bright Day at Venice" (1882), and some fine mural decorations, including those for Mendelssohn Hall, New York City.

BLUMAUER, blōō'-mou-ēr, ALOYS (1755-98). A German poet, born in Steyer. His works, which are chiefly coarse satires on the clergy and on the Jesuit Order (of which he himself had become a member a year before its dissolution in 1773), enjoyed a wide popularity. He is remembered, however, chiefly for his *Abenteuer des frommen Helden Æneas* (1784-88; published with introduction and commentary by E. Griesbach, 1872), a coarse travesty on Vergil's *Æneid*, which is still widely read in Germany. His complete works, *Sämtliche Werke*, appeared after his death in 4 vols. (1801-03; republished 4 vols., 1884). Consult Hofmann-Willenhof, *Aloys Blumauer* (Vienna, 1885).

BLUMENBACH, blōō'men-bäg, JOHANN FRIEDRICH (1752-1840). A German naturalist, physiologist, and anthropologist, born in Gotha. He studied in Jena and in Göttingen, where he graduated with the degree of M.D. in 1776. He began to teach in Göttingen in 1776, became a professor in 1778, and exercised the greatest influence as a teacher for more than fifty years. He founded the science of anthropology. His *Collectio Craniorum Diversarum Gentium* (1790-1828) gave the results of observations upon the skulls of different races. He advocated the theory of the unity of the human race, and divided it into five types—Caucasian, Mongolian, Malay, American, and Ethiopian. His *Handbuch der Naturgeschichte* (1780) has gone through many editions. He was the first to place comparative anatomy on a thoroughly scientific basis, and in 1805 published his *Handbuch der vergleichenden Anatomie*. He speculated on the power of generation and regeneration, and imagined that a *nisus formativus*, or formative tendency, was possessed by all living things. Consult his *Ueber den Bildungstrieb und das Zeugungsgeschäft* (Göttingen, 1791).

BLUMENTHAL, blōō'men-täl, JACOB VON (1829—). A German pianist and composer, born in Hamburg. He studied under Grund, Bocklet, Sechter, Halévy, and Herz, and in 1849 went to London. There he was appointed pianist to Queen Victoria, taught music, and composed many brilliant pieces for the pianoforte and popular songs, of which "My Queen," "The Bend in the River," "The Broken Flower," and "The Venetian Boat-Song" are the best known.

BLUMENTHAL, LEONHARD, Count von (1810-1900). A Prussian field-marshal. He was born July 30, 1810, at Schwedt-on-the-Oder. He received a military education in the Prussian Cadet Corps, and in 1827 became an officer in the Reserve Guard. From 1830 to 1833 he studied at the Berlin Military Academy, and later served in all branches of the army, in order to acquire a full military training. In 1848 he became a member of the Prussian General Staff. He was chief of staff of the Schleswig-Holstein Army in 1849; became aide-de-camp to Prince Frederick Charles (1858); colonel of the Seventy-first Infantry (1860); and chief of staff of the Austro-Prussian Army in the war against Denmark (1864). In the same year he was made a major-general, and in the campaign of 1866 against Austria acted as chief of staff to the Crown Prince Frederick William, and distinguished himself at Königgrätz. After the war Blumenthal became a lieutenant-general. During the Franco-Prussian War he again acted as chief of staff to the Crown Prince, and participated in the events leading up to Sedan and the capitulation of Paris. He was afterwards intrusted with the command of the Fourth Army Corps, with headquarters at Magdeburg, and given the rank of general of infantry in 1873. In 1888 he was created field-marshal, and given

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important duties as inspector-general of the Fourth Division. He died December 22, 1900.

BLUMENTHAL, Oskar (1852—). A German dramatist and satirist, born in Berlin. He founded there the Lessing Theatre (1888), which he managed from 1888-97, and devoted chiefly to the production of contemporary comedies. Among his own works first produced at the Lessing Theatre, the most popular are the comedies, *Der Probepfeil* (1882); *Die grosse Glocke; Im weissen Rössel,* with G. Kadelburg (1898); *Matthias Gollinger,* with M. Bernstein (1898); *Die strengen Herren,* with G. Kadelburg (1900); *Der schwarze Schleier* (1887); and *Heute und Gestern,* with G. Kadelburg (1892). He has also published satirical articles and epigrams. Consult Wald (1885), and Wolff (Berlin, 1887).

BLUM'ER, George Alder (1851—). An Anglo-American physician, born in Sunderland, England. He studied at the University of Edinburgh, graduated in 1879 at the medical department of the University of Pennsylvania, and in 1879-80 was resident physician at the German Hospital, Philadelphia, Pa. From 1880 to 1886 he was assistant physician at the Utica State Hospital, of which he was superintendent in 1886-89. In 1889 he was appointed superintendent of the Butler Hospital for the Insane, Providence, R. I. He also became an associate editor of the *American Journal of Insanity.*

BLUMER, blōō'mĕr, Johann Jakob (1819-75). A Swiss statesman and historian, born in Glarus. He studied in Zürich, Bonn, and Berlin. In 1843 he was elected to the Landrat, and in 1861 became president of the Court of Appeals. Between 1861 and 1874 he completed his revision of the civil and criminal law of Switzerland, and subsequently he was chosen president of the Permanent Court of the Swiss Federation. His books include *Staats- und Rechtsgeschichten. der Schweizerischen Demokratien* (1850-59), and *Handbuch des Schweizerischen Bundesstaatsrechts* (1877-87).

BLÜMNER, blụm'nĕr, Hugo (1844—). A German classical archæologist, born in Berlin, August 9, 1844. He taught in the universities of Breslau and Königsberg, and has been since 1877 professor in the University of Zürich. He is author and editor of many philological and archæological works, of which the most important are: *Die gewerbliche Thätigkeit der Völker des Klassischen Altertums* (1869); *Technologie und Terminologie der Gewerbe und Künste bei Griechen und Römern* (4 vols., 1874-88); *Leben und Sitten der Griechen* (1887); *Maximaltarif des Diokletian,* with Theodor Mommsen (1893); *Pausaniæ Græciæ Descriptio* (1896); reviser of Hermann, *Griechische Privataltertümer* (1881), etc.

BLUN'DELL'S SCHOOL. One of the best of the smaller English public schools, especially noted in the west of England. It was founded in 1604 by Peter Blundell, in Tiverton, Devonshire. Beginning life as a poor boy, he amassed a considerable fortune, most of which was left to charities, the greatest of which was this school. There were founded in connection with it five scholarships at Balliol College, Oxford, for scholars of this school, which have brought many men from there to Balliol. Among the distinguished men who came from Blundell's are Bishops Bull, Hayter, and Conybeare, Abraham Hayward, the essayist, and R. D. Blackmore, the novelist. John Ridd, the hero of *Lorna Doone,* was also a member of the school.

BLUNDERBUSS (either corruption of Dutch *donderbus,* thunder-box, i.e. musket, or from *blunder* + Dutch *bus,* Ger. *Büchse,* box, barrel of a gun). An old-fashioned short musket with a wide, smooth bore sufficient to take in several shots or bullets at one charge. A number of the English and German troopers in the Seventeenth Century were armed with this weapon, which had a limited range, and was more particularly effective at close quarters, or in the defense of narrow passages. It has long been obsolete. See Small Arms.

BLUNT, James G. (1826-81). An American soldier. He was born in Trenton, Maine, and in 1849 graduated at the Starling Medical College, Columbus, Ohio. In 1856 he settled in Kansas, where he strenuously opposed the introduction of slavery, and was a member of the convention that framed the State Constitution. He entered the Federal Army as lieutenant-colonel at the outbreak of the Civil War, and in 1862 was made brigadier-general, and placed in command of the Department of Kansas. On December 7, at Prairie Grove, he defeated a force under General Hindman, and thus checked the advance of the Confederates into Missouri. He was raised to the rank of major-general in November, 1862, but in 1863 was relieved of the command of the department, and assigned to the Army of the Frontier.

BLUNT, John Henry (1823-84). An English High-Church theologian and writer on ecclesiastical history. He was born in Chelsea, studied at University College, Durham, and was ordained a priest of the Established Church in 1855. He was appointed a Vicar of Kennington in 1868, and in 1873 rector of Beverston. He contributed much to reviews and periodicals, and his publications include *The Atonement* (1855); an *Annotated Book of Common Prayer* (1884); and an important *History of the Reformation of the Church of England* (1862-82), written from the High-Church standpoint.

BLUNT, John James (1794-1855). An English clergyman and author, born in Newcastle-under-Lyme, Staffordshire. He graduated in 1816 at Saint John's College, Cambridge, was curate at Hodnet, Shropshire, to Reginald Heber, whom he succeeded; and subsequently was curate also at Chetwynd. In 1834 he became rector of Great Oakley, Essex, and in 1839 professor of divinity at Cambridge. He wrote a considerable number of works on ecclesiastical history and biblical criticism, besides several volumes of sermons. The best-known of his publications is *Undesigned Coincidences in the Writings both of the Old and New Testament, an Argument of their Veracity* (1847). Consult Selwyn, "Memoir," in Blunt's *Two Introductory Lectures* (1856).

BLUNT, Wilfrid Scawen (1840—). An English traveler and poet. He was born near Crawley, England, August 17, 1840. His mother being a Catholic convert, he was educated at Stonyhurst and at Saint Mary's, Oscott. He served for some years as attaché to various British embassies in Europe, and in 1869 married Anne, daughter of the Earl of Lovelace, and granddaughter of Lord Byron, with whom he

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traveled through Spain, Algeria, Egypt, and the Syrian Desert. In 1882 he championed the cause of Arabi Pasha (q.v.), and later took up the Nationalist cause in Ireland. In 1887-88 he was imprisoned for two months for taking part in a prohibited meeting at Woodford, in County Galway. Blunt won attention by the *Love Sonnets of Proteus* (1880), containing a fine sonnet on Gibraltar. This volume has been followed by *Esther* (1892); *Griselda* (1893); the *Quatrains of Youth* (1898); *Satan Absolved: A Mystery* (1899); and many other poems. Blunt's poems are intensely human and realistic. Consult Henley and Wyndham, edd., *The Poetry of W. Blunt* (London, 1898).

BLUNTHEAD. A curious colubrine innocuous snake (*Amblycephalus boa*) of Java and the East Indies, the type of the family Amblycephalidæ, and allied to the night tree-snakes (Dipsadidæ). It is slender, about 3 feet long, and purplish in color, densely marbled and mottled with brown, with rosy spots and checks, and lips carnation-red. Its large head is shaped like that of a mastiff, "which animal it further resembles by snapping at whatever disturbs it." Having a prehensile tail, it climbs with great ease, and at night creeps about the thatch of houses in Java and Borneo, in search of insects, the natives welcoming it as a vermin-destroyer.

BLUNTSCHLI, blunt'shlē, JOHANN KASPAR (1808-81). A German jurist, born in Switzerland, 1808; graduated at Bonn in 1829. He was professor of law in the University of Zürich, a member of the grand council of the local government, and strongly opposed the civil war of 1847-48. In 1848 he became professor of German and international law at Munich, and in 1861 professor of political science and jurisprudence at Heidelberg. In 1864, with Baumgarten and others, he founded the Protestant Union, and subsequently presided over several Protestant conventions, and over the General Synod at Baden in 1867. He also presided, in 1861, over the International Congress of Jurists in Dresden. Bluntschli was one of the founders and (1875-77) president of the Institute of International Law at Ghent, and was generally considered one of the highest European authorities on international law and the laws of war. He was a Liberal in politics, and in 1867 was elected to the *Zollparlament* (customs parliament). He died in 1881. His valuable library is now owned by the Johns Hopkins University of Baltimore. His legal writings include *Geschichte des allgemeinen Rechts* (1864); *Das moderne Kriegesrecht* (1866); *Das moderne Völkerrecht* (1868); and *Die Lehre vom Staat* (1875).

BLUSHING (AS. *blyscan*, to glow, *blysa*, a torch). A sudden reddening of the face, neck, and breast, owing to some mental shock, most commonly of the character of shyness, shame, or modesty. It is produced by an increased flow of blood into the capillary vessels over the parts where the blush extends, resulting from a temporary vasomotor paralysis. Besides reddening the complexion, it creates a sensible augmentation of heat in those parts. The feeling that accompanies a blush is one of distress—of heat and general discomfort. Children rarely blush. Darwin is authority for the statement that people of races that habitually are nearly naked blush down to the waist. There is a nerve filament, from the sympathetic system, lying within the sheath of and parallel with each artery and capillary, controlling the expansion and contraction of the muscular coat of the vessel. This is called a vasomotor nerve. During the mental stress that accompanies blushing, the action of the vasomotor nerve is suspended and the arteries and capillaries dilate, producing the phenomenon, the heart's action being unaffected. Mental stress of a nature to moderate or control the heart's action is more likely to cause pallor of the surface, owing to the decreased amount of blood passing through the arteries and the correspondingly greater contraction of their coats. Consult Darwin, *Expression of Emotions in Man and Animals* (London, 1872).

BLÜTHGEN, blut'gen, VICTOR (1844—). A German author. He was born in Zörbig, near Halle; studied theology at the University of the latter city; assisted in the preparation of a theological dictionary, and was employed for a short time as a journalist. His best-known works are his *Gedichte* (1881); a number of books for the young, including his text to Flinzer's *Schelmenspiegel* (1876); *Froschmäusekrieg* (1878); *Hesperiden* (1879), a volume of tales, which was translated into Danish; the novelettes *Bunte Novellen* (2 vols., 1880), *Der Friedensstörer* (1883), *Poiret-house* (1884), and *Die Stiefschwester* (1887); and the novels *Aus gärender Zeit* (2 vols., 1884), and *Frau Gräfin* (2 vols., 1892).

B'NAI B'RITH, b'nī b'rēth, INDEPENDENT ORDER OF. An organization of Israelites of German extraction, founded in America in 1843, and since extended through Germany and in the East. It somewhat resembles the Masonic organization, without its secrecy and ceremonial. Its object is the moral elevation of its members, who now number some 28,000 in more than 400 lodges.

BOA, bō'ȧ (Lat. *boa*, *bova*, a large serpent; perhaps akin to *bos*, ox, owing to its size). Any of the large non-venomous snakes of tropical America of the family Boidæ. These are closely related to the pythons; and popularly the name is applied to any large snake that entwines its prey, crushes it, and swallows it whole—a 'boa-constrictor.' These great serpents feed upon living animals of all sorts, for which they lie in wait, often hanging for hours together from trees. The weight of the body is borne under such conditions partly by the prehensile tail and partly by two opposing hooks on each side of the vent. These hooks are held by muscles attached to several bones, all below the skin, which are the rudiments of the hind limbs of the higher vertebrates. The boa seizes its prey with a swift dart of the head and forward part of the body, and the numerous long backward-leaning teeth hold the struggling animal until the snake throws one or more folds about it and compresses it to death. It may also seize an animal by knotting a fold of its tail or some part of its body around it; and thus boas have been seen to capture, crush, and hold two or three victims at once. The swallowing is a slow and laborious process, aided by a copious flow of saliva, which serves both to lubricate and to digest the mass of food. Boas are able to swallow creatures considerably larger than their own heads, because the loose and elastic articulation of the jaws (see SNAKE) enables the mouth to be opened both

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vertically and horizontally. While the process of digestion is going on, for which weeks may be necessary, the boa remains in a state of torpidity, and then is easily killed. The boas are afflicted with many and at times fatal intestinal worms, received from the bodies of their victims. Excepting such adversaries, the larger of these powerful serpents have almost nothing to fear.

The name *Boa-constrictor* properly belongs to one of the smaller of the boas, 12 feet long, which is most abundant in Guiana and Brazil. It is an exceedingly handsome serpent, brownish, with a series of complicated and connected blotchings. (See accompanying plate.) The emperor (*Boa imperator*) of Central America and Mexico resembles it, but has the markings separated by light lines along the sides. A third allied species is the lamanda, to which a sort of worship was paid by the ancient Central Americans, named *Boa diviniloquax*, of which the Mexican boa (var. *Mexicana*) is a northerly form. A fourth, and probably the best-known, species, is the ringed boa (*Epicrates cenchria*), which is found all over Brazil, but nowhere numerously, and northward to Costa Rica; it is about 5 feet long, and is marked with circular or 8-shaped spots, having a dark border. This is one of the species called aboma and jiboya—Brazilian terms which, like 'boiguaçu' and some others that have found currency in books, are very indefinite. The genus Epicrates embraces the 'tree-boas,' most of which are slender snakes of moderate length, having distinct necks and somewhat triangular heads, which obtain their food in trees and bushes, or by hanging from branches and striking passing prey; they have the singular faculty of clinging firmly to the upper surface of a leafy branch without curling any part of the body around it, and no amount of wind-waving or other agitation will loosen the hold of their looped length short of complete overturning. The swiftness of their stroke is too great to follow with the eyes. Another genus is often represented in menageries by the dog-headed boa (*Xiphosoma caninum*) of the Amazon region. It often exceeds 5 feet in length and is green above and bright yellow beneath, ornamented with clustered white spots edged with purplish black. The sand-snakes (*Eryx*), the Californian lichanuras, and various other generic forms also belong to the Boa family.

The greatest of all the boas is the water-boa (*Eunectes murinus*), best known as the anaconda. Although the home of this huge serpent is wholly within the valleys of the Amazon and Orinoco, the name was borrowed from the Portuguese name of a Ceylonese python, and fixed by Cuvier in 1817; its most widespread Brazilian name is 'sucuriuba,' or simply 'sucuria.' It is far more aquatic in its habits than any other big American snake, spending a large part of the time in the water, to which its structure is adapted, the nostrils being very small, placed vertically in the top of the heavily scaled nose, and closable by valves. Thus it can swim safely under water, and need only push the merest point of its head above the surface in order to take breath. Its eyes, also, are elevated, prominent, and so placed that it can see both ahead and downward (into the water), which most snakes cannot do. Although, like the others, it hangs from trees or lies coiled on the bank waiting to seize anything manageable that may come in its way, it also sinks its body in the water and waits at chosen places near the bank until some animal comes down to drink, when it seizes it by the nose with a grip from which beasts rarely escape before they are dragged down, enfolded, and drowned in its crushing embrace. One of the Brazilian names is 'deer-swallower,' and stories are told of its killing and eating cattle, horses, and jaguars; but these must be regarded as fanciful tales, inspired by the same imagination which says it reaches a length of 50 or 80 feet. The largest specimen actually measured is that (a stuffed skin) in the British Museum, which is 29 feet long; it is not probable that this is often much exceeded, while the average length is, no doubt, nearer 20 than 30 feet. A snake of the largest size could certainly kill, and might swallow, one of the small Brazilian deer, at any rate a hornless doe or fawn; but the more ordinary food consists of rodents, from the capybara down, peccaries, birds and their eggs, and fishes and reptiles, including their own kind. This serpent is rich green in color and marked with round blackish blotches, which often run together, as shown in the accompanying illustrations.

Not much is known as to the reproduction of boas, most of which seem to produce their young alive, while some are known to lay eggs. The rather contradictory experience on this point, derived from observation of captive specimens, is given in Miss Hopley's *Snakes*. All the boas are hardy and long-lived, and those mentioned above are to be seen in various zoölogical gardens, where they usually thrive well if protected from cold and intelligently treated, and often come to know their keepers and be very friendly with them. Certain species are constantly tamed and kept as pets among the villagers of Brazil and Central America; and occasionally completely tamed specimens have been known in other parts of the world, not only among performers in animal shows, but in private, of which the most famous recent example is the boa 'Cleo,' kept by Mr. and Mrs. Mann in London, and described by Frank Buckland in *Land and Water* and elsewhere about 1877. For special information, consult: Moles and Ulrich, "Serpents of Trinidad," in *Proc. Zoöl. Soc. of London*, 1894, page 499 et seq.; Hopley, *Snakes* (London, 1882); and Gosse, *A Naturalist's Sojourn in Jamaica* (London, 1851).

BOAB'DELIN, MAHOMET. A character in Dryden's *The Conquest of Granada*.

BOABDIL, bō'ab-dēl' (corrupted from Abu-Abdallah). The last Moorish King of Granada, surnamed *El Chico*, 'The Little.' He dethroned his father, Abu-'l-Hassan, in 1481, and two years later was defeated by the Castilians near Lucena, and taken prisoner, but on agreeing to pay tribute was set free and returned to Granada to struggle for the throne against his father and his uncle, Abdallah-el-Zaghal. The power of the Moors was greatly shaken by this civil conflict, and the dispute was finally settled by Ferdinand of Aragon, who in 1492 captured Granada, in spite of the reckless courage of the Moors and of Boabdil. The story goes that Boabdil, having handed over to Ferdinand the keys of the city, was riding on toward the mountains, when he turned, at Padul, on a spur of the Alpujarras, to take a last look at the towers of Granada. "Allhu Akbar!" (God is great), he exclaimed,

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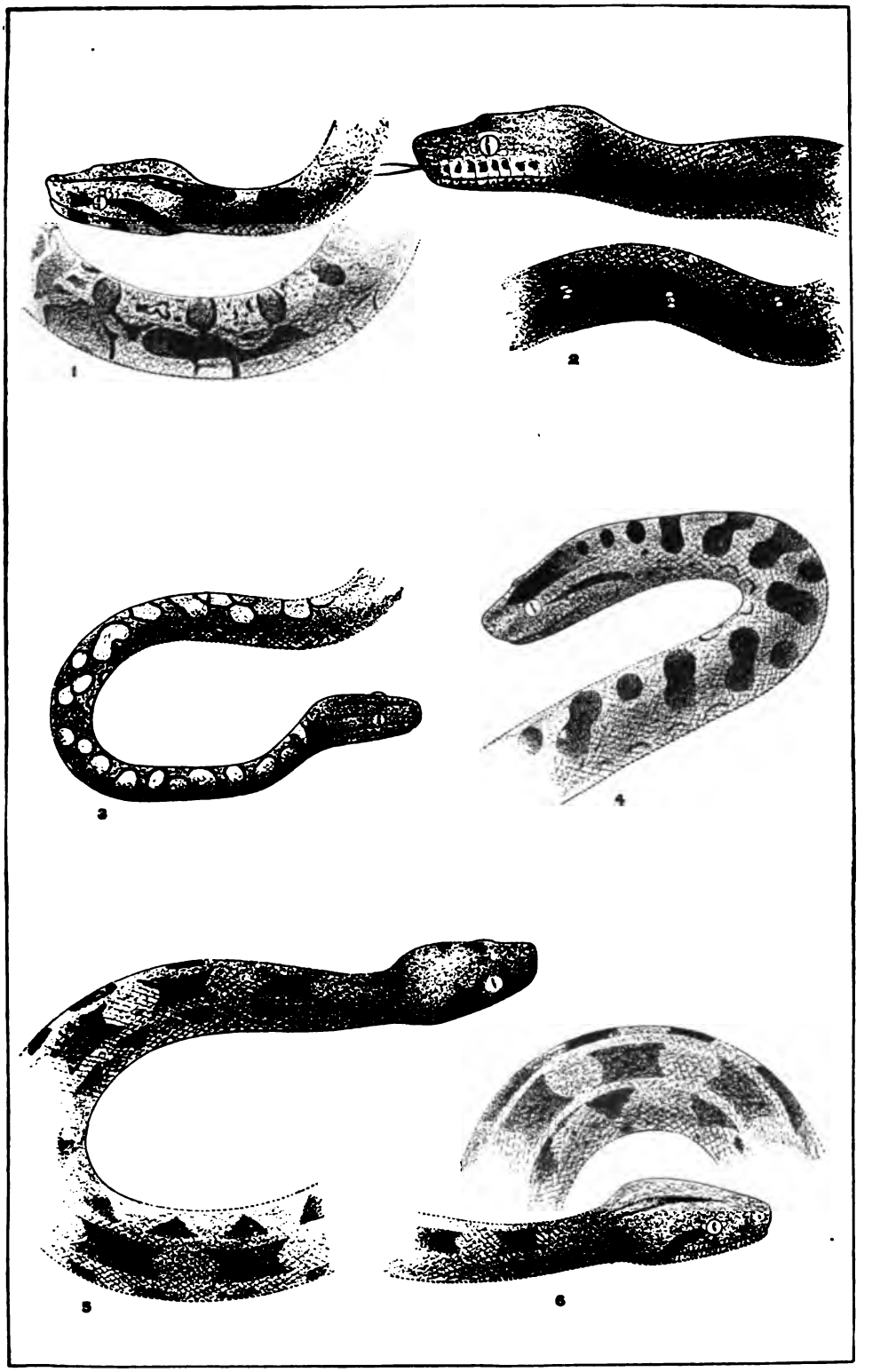
BOAS, SHOWING SPECIFIC MARKINGS



1. COMMON BOA (Boa constrictor).
2. DOG-HEADED BOA (Xiphosoma caninum).
3. ABOMA OR RINGED BOA (Epicrates cenchria).
4. ANACONDA (Eunectes murinus).
5. MEXICAN BOA (Boa diviniloquax, var. Mexicana).
6. IMPERIAL BOA (Boa imperator).

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bursting into tears. His mother standing beside him exclaimed, "You may well weep like a woman for what you could not defend like a man." The spot still bears the name of *El Ultimo Sospiro del Moro*, 'the last sigh of the Moor.' Boabdil soon crossed to Africa and lost his life in battle. See GRANADA.

BOAC, bō-äk'. A town of Mindoro, Philippines, situated about 48 miles from Calapan, the capital (Map: Philippine Islands, F 6). Population, 14,725.

BO'ADICE'A (? -A.D. 62). Queen of the Iceni, a tribe inhabiting the eastern coast of Britain. Prasutagus, her husband, who died about A.D. 60, left his wealth jointly to the Roman Emperor and to his two daughters, hoping that by this artifice his kingdom would be protected from oppression; but the Roman soldiery, taking advantage of the defenseless condition of the country, began to plunder unscrupulously. Boadicea herself was scourged, her daughters were violated, and the noblest among the Iceni were treated as slaves. These outrages drove them into a revolt, in which they were joined by the Trinobantes. Boadicea gathered round her a large army, attacked and captured the Roman colony of Camulodunum (Colchester); took Londinium and Verulamium, and destroyed, according to Tacitus, 70,000 Romans. Suetonius, the Roman Governor of Britain, now advanced at the head of about 10,000 legionaries against Boadicea, who, it is said, had under her command over 200,000 men. A dreadful battle ensued (A.D. 62), in which 80,000 Britons were said to have perished, and only 400 Romans. These figures, of course, cannot be trusted; but the victory must have been decisive, as it established the authority of the Romans in Britain. Boadicea, overwhelmed with despair, committed suicide. Consult: Tacitus, *Annales*, Book XIV. (London, 1872); Elton, *Origins of English History* (London, 1882); Rhys, *Celtic Britain* (London, 1882).

BOAR (AS. *bār*, OHG. *bēr*, Ger. *Bär*, brood-boar; cf. Russ. *borovŭ*, boar), WILD. The common and most typical species (*Sus scrofa*) of wild swine, which exceeds the largest domestic swine in size, and is far superior to them in strength and swiftness. It is grayish-black in color, covered with short, woolly hair, thickly interspersed with stiff, coarse bristles, which assume the form of a mane along the spine. The ears are always black. Its great tusks are formidable weapons, but when old the tusks curve over the snout and are no longer serviceable for goring; then, however, the teeth of the upper jaw protrude and curve outward, serving the same purpose as the tusks had done. The animal is native in Europe, Asia Minor, and North Africa, inhabiting the deep recesses of marshy forest grounds. Boars were common in England until the time of Henry II., and then not found until, in the reign of Charles I., an unsuccessful attempt was made to raise them in the New Forest. In the time of the Conqueror any one killing a wild boar was liable to have his eyes put out. Consult Harting, *British Animals Extinct Within Historic Times* (London, 1880).

It was for centuries a favorite beast of chase with the nobles of Europe, and was hunted chiefly on foot with the spear, aided by a breed of great dogs now nearly extinct (see HOUND), its strength and ferocity rendering the sport alike exhilarating and dangerous. There is little of boar-hunting now, except upon certain great estates in eastern Europe, where the animals are bred for the purpose of sport. In India, however, the wild boars of that country are pursued and speared by mounted men, who regard 'pig-sticking' as the most exciting sport the Orient affords. The courage and tenacity of life exhibited by pursued and wounded animals are surprising. The animal seeks its food at night, and feeds chiefly on roots and grain, though it will eat smaller animals, birds' eggs, etc. The bristles of the boar are much used for brushes. Besides this one, several other species of boar have been described, of which three at least seem to be valid—*Sus vittatus* of Asia and Africa, *Sus venucosus* from Java and Celebes, and *Sus barbatus* from Borneo. No species of the genus Sus are natives of America or Australia. See PECCARY; SWINE.

BOARD (AS. *bord*, Ger. *Bord* and *Brett*). In nautical language, a term which has numerous significations. The terms *plank* and *board* were formerly used without much discrimination; hence the application of the word *board* to express in a figurative manner the deck or side of a vessel. From this use are derived the expressions *aboard*, *on board*, *boarding* (i.e. the act of going on board for a friendly or inimical purpose), *inboard* (inside the rail or bulwarks), *outboard*, etc. Before the days of keels, and for small boats until comparatively recent times, a broad board called a *leeboard* was secured to the side and projected into the water in a manner to prevent *leeway* (q.v.) when under sail. From this resulted the expressions *a good board*, which meant to lose nothing to leeward on a single stretch while tacking (q.v.), a *half board*, *stern board*, etc. The operation of *boarding* a vessel of the enemy meant the forcible entry for the purpose of capturing it; in the days of sailing vessels, slow steamers, and slow-firing guns it was an operation of importance, but it would not now be attempted except in unusual circumstances.

BOARD (from the *board*, or table, at which the officers sit). The general name applied to persons who in their collective capacity have the management of some public office or department, bank, railway, charity, or, indeed, of any other trust.

BOARDING-HOUSE (from *board* or table for food). The legal liability of a boarding-house keeper differs from that of an innkeeper (q.v.) in three important respects. The first difference is due to the fact that he does not hold himself out as engaged in a common public employment. Consequently, he is at liberty to reject any person who may apply for accommodations, whether his house is full or not. No person has a right to insist upon boarding with him until a special agreement has been made between them. In the second place, a boarding-house keeper is not subject to the extraordinary liability for his patrons' property which rests upon an innkeeper for the chattels of his guests. He is bound to exercise only such care of it as an ordinarily prudent man would take of his own property in similar circumstances. But that degree of care the boarding-house keeper is legally bound to exercise, at least over his board-

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ers' goods which are fairly within his custody. In the third place, the keeper of a boarding-house has no lien on his boarders' property for bills owing by them, at common law, although by statute in some jurisdictions a lien has been accorded. It is held, generally, that a boarding-house keeper impliedly undertakes that his premises are reasonably fit for occupation. It is not necessary that he make that statement in express terms. His offer of the premises to boarders is a representation that they are fit for such use. See the authorities referred to under INNKEEPER.

BOARD'MAN, GEORGE DANA (1801-31). An American missionary. He was born in Livermore, Me., graduated at Waterville College (now Colby University) in 1822, and studied at Andover Theological Seminary. He was ordained as a Baptist minister in 1825, and in the same year sailed for Calcutta as a missionary. In 1827 he established a mission at Burma, and was especially zealous in his work among the Karen villages. His widow married the Rev. Adoniram Judson (q.v.). Consult A. King, *Memoir of George Dana Boardman* (Boston, 1856).

BOARDMAN, GEORGE DANA (1838—). An American Baptist clergyman. He was born at Tavoy, Burma, and was educated at Brown University (1852), and at the Newton Theological Institution. He was pastor of the First Church, Philadelphia, from 1864 to 1894. In June, 1899, he established at the University of Pennsylvania the permanent lectureship known as the 'Boardman Foundation in Christian Ethics.' He is ex-president of the Christian Arbitration and Peace Society, and of the American Baptist Missionary Union. His most important production is a monograph, *Titles of Wednesday Evening Lectures.* It embraces 981 of his lectures, delivered between 1865 and 1880, and comprises a complete exegesis of the Bible. His other writings include *The Epiphanies of the Risen Lord* (New York, 1879); *The Problem of Jesus; Disarmament of Nations* (1880); *The Coronation of Love; The Two Bibles; The Kingdom* (1899); *The Church* (1901); *The Golden Rule* (1901).

BOARD OF TRADE. See TRADE, BOARD OF.

BOARFISH. A southern European fish (*Capros aper*) of the family Caproidæ, having a much protracted hog-like snout. The body is oval, compressed, and carmine in color, with seven transverse orange bands on the back. The flesh is little esteemed. For illustration, see Plate of HARVEST-FISH.

BOARHOUND. See HOUND.

BOAR'S HEAD, THE. The haunt of Shakespeare's Falstaff and his crew. It was a tavern in Eastcheap, London. It fell in the great fire of 1666. It was rebuilt, but had to give way for an approach to London Bridge. The site is now occupied by a statue of William IV.

BOAS, bō'ȧs, EDUARD (1815-53). A German author, born at Landsberg. He is remembered chiefly for his works on Goethe and Schiller, including *Nachträge zu Schillers sämtlichen Werken* (Stuttgart, 1838-40); *Nachträge zu Goethes sämtlichen Werken* (Leipzig, 1841); and *Schiller und Goethe im Xenienkampf* (1851). His *Schillers Jugendjahre* (1856) and *Schillers und Goethes Xenienmanuskript* (1856) were published posthumously by W. von Maltzahn. His other works include *In Skandinavien. Nordlichter* (1844); the humorous novel *Des Kriegskommissars Pipitz Reise nach Italien* (1841); and the idyllic poem *Pepita* (1844). He published selections from his prose and poetical works in his *Schriften*, 5 vols. (1846-49).

BOAS, FRANZ (1858—). A German-American anthropologist. He was born at Minden, Westphalia, studied at Heidelberg, Bonn, and Kiel, and in 1883-84 made a scientific journey through the Baffin's Land region. He was assistant in the Royal Ethnographical Museum in Berlin from 1885 to 1886, and an instructor in geography at the University. From 1886 to 1888 he was an associate editor of *Science;* from 1888 to 1892 instructor in anthropology at Clark University, and in 1899 was appointed professor of anthropology at Columbia University. He is a member of the National Academy of Science, in 1900 was president of the American Folk-Lore Society, and in 1901 became curator of ethnology in the American Museum of Natural History. His publications include *Baffin's Land* (1885), and "The Central Eskimo," *Sixth Annual Report, United States Bureau of Ethnology* (1888).

BOAST (origin uncertain). A term used in sculpture to define the first contour of a roughly hewn block before the working out of ornament and details. Portions of buildings that were designed for ornamentation, if in obscure places, are often left in this rude state.

BOAT (AS. *bāt*, Ger. *Boot*; cf. Fr. *bateau*, boat, from Low Lat. *batellus*, dimin. of *battus*, *batus*, boat). A small vessel propelled by oars, sail, or steam. The name is also applied to large vessels built to navigate rivers and interior waters, and sometimes to large sea-going vessels; but in such cases it is ordinarily used as part of a compound word or expression, e.g. steamboat, ferryboat, canal-boat, packet-boat, etc. Boats are of numerous types and forms, representing the various developments of the raft and dugout principles, which may be said to meet in the framed open boat, as it embodies the hollow form of the dugout and the framing of the raft. The simplest form of boat is called a *punt* or *bateau*, and it is much used in shallow interior waters, where it is often propelled by pushing with a pole instead of using oars; it has a flat bottom and sides made of single boards. The *dory* is a variety of punt, but, being intended for use in rough water, it is deeper and more shapely. Dories are used in great numbers by fishing-vessels. Small, shallow, framed boats are called wherries or Whitehall boats. In the United States Navy boats are of three types—*cutter*, *whaleboat*, and *steamer*. The cutter type includes the dingeys and launches, the former being smaller than the cutter, and the latter being larger; all are square-sterned. The whaleboat is sharp at both ends. Steamers resemble cutters in build, but are heavier and have rounded sterns; the smaller steamers are frequently called steam-cutters. *Gigs* and *barges* are commonly of cutter build, but are larger, narrower, and of less depth; some gigs are of whaleboat form. Dingeys usually have four oars; cutters and whaleboats from six to fourteen; gigs five or six; barges twelve to fourteen; and launches twelve to sixteen. All are supplied with masts

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and sails to be used when desired. In modern men-of-war boats are stowed on skid-frames amidships in order to keep them out of way of the guns; a certain number of davits are fitted, however, as a matter of convenience during ordinary service. The boats of merchant ships are of various types, and their number depends upon the size of the vessel and the character of the service; dories are much used in the United States coasting-vessels, but large boats are usually carried; deep-sea sailing ships usually have one large boat, called the *launch* or *longboat*, in addition to smaller ones.

Boats are usually built of wood; they are liable to receive many minor injuries, and the repair of an iron hull is a much more difficult matter than that of a wooden one; moreover, an iron boat is much more likely to punch a hole in her bottom or side in striking a sharp object than is a wooden one. There are three different methods of building wooden boats: The *carvel*, with fore-and-aft planks, the edges meeting, but not overlapping; the *clinker*, also with fore-and-aft planks, but with the edges overlapping each other like shingles; and the *diagonal*, the planking of which runs diagonally, the inside planks running in a contrary direction to the outside ones, and their edges meeting. On some steamers the number of passengers carried is so great that sufficient room cannot be found for boats of the ordinary type, and these vessels often carry a number of collapsible boats with wooden frames and covered with canvas. Boats are *single* or *double banked*, as they have one or two oars to a thwart. The seats for the crew of a boat are called the *thwarts*, the strip on which the thwarts rest is called the *rising*, the space abaft the after thwart the *stern sheets*, that forward of the foremost thwart the *foresheets*, the spaces for the oars the *rowlocks*, and where the coxswain of a man-of-war boat sits, the *coxswain's box*.

BOAT-DAVIT. When not resting inboard on chocks or skid-frames, boats are carried at the *davits*. These are secured to the ship's side, the end resting in sockets or saucers (if the davits revolve), with a collar around the davit higher up and near the ship's rail. Davits are sometimes straight, but are usually curved somewhat in the shape of an inverted letter J (thus ʃ). The upper blocks of the *boat-falls* (see BLOCK; also TACKLE) are secured to the curved arms of the davits, and the lower blocks hook into rings in the boat. Boat-davits are usually made of round iron bars, but stronger and lighter davits are made of T-rail iron or of box-girders.

BOAT-HANDLING APPARATUS. The size and weight of many boats now carried by ships preclude their being hoisted by davits, and all boats carried inboard on men-of-war require special apparatus. In the United States Navy boats stowed on skid-beams are usually handled by a *boat-crane*, which is shaped like a boat-davit, but is many times larger. The power to operate it is either steam or electric. The boats, when about to be hoisted, have wire-rope contrivances called *slings* fitted to them, and the tackle of the boat-crane hooks in the ring of the slings. In the British Navy large boats and those on the skid-beams are handled with *boat-derricks*, consisting of strong booms hinged at the heel in heavy sockets on the mast. *Life-boats* are carried at davits of the usual pattern, but they have special apparatus for lowering them and for detaching them after they are lowered. There are many types of such devices in use; the general feature which is common to all is an arrangement whereby the boat is instantaneously released from the hoisting-gear, and it is customary to detach the boat two or three feet above the water and let it fall the rest of the distance. In a rough sea it is very difficult to unhook the ordinary falls, and a failure to do so promptly might cause the boat to swamp or be crushed against the ship's side.

BOATBILL. A South American night-heron (*Cancroma cochlearia*), differing from the true herons mainly in the form of the bill, which is comparatively short and very broad, as shown in the accompanying illustration. It is about the size of a domestic fowl, has shorter limbs than most of the herons, but resembles them in plumage, and is abundantly provided with elongated feathers on the back of the head and neck, which it erects when irritated. The skin beneath the lower jaw is bare and distensible in a large gular pouch. Its general color is rusty red, the forehead and breast whitish. It inhabits Guiana, Brazil, etc., sits perched upon trees which hang over streams, and darts down upon fish, which seem to be its principal food. Another species (*Cancroma zelendoni*) inhabits Central America. These form a subfamily, characterized by having four powder-down tracts. See HERON.

HEAD OF A BOATBILL.

BOAT-FLY. See WATER-BOATMAN.

BOATSWAIN (*boat* + *swain*, servant). An officer of the navy of warrant rank. On board ship he has, under the executive officer, charge of the rigging, anchors, cables, cordage, etc. He summons the crew at all general evolutions, and acts as assistant to the executive in carrying on the business of the ship; on old-type ships his station was on the forecastle. A boatswain's *call* or *whistle*, which he uses in summoning the crew or to call attention as a preliminary to passing orders, etc., is his badge of office. In 1902 there were 73 boatswains on the active list of the United States Navy. When a boatswain has served ten years in that grade, he is advanced to the grade of *chief boatswain* and commissioned with the rank of ensign. It is the custom at present to fill vacancies in the boatswain's list by advancing competent petty officers who were formerly naval apprentices. The compensation when at sea is $1200 for the first three years' service, and is increased $200 for every additional three years until the maximum of $1800 is reached. Chief boatswains receive the same pay as ensigns.

BOATSWAIN, or **BOATSWAIN-BIRD.** A sailor's name for two sorts of sea-wandering birds: (1) A skua-gull or jaeger, especially Richardson's (*Stercorarius parasiticus*); (2) a tropic bird (q.v.). The reference in each case seems to be to the long, pointed feathers in the tail, which

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suggest a marlinspike, the boatswain's badge of office; in fact, skuas are also known locally in New England as 'marlinspikes.'

BO'AZ. See JACHIN.

BOBAC, bō'băc (Pol. *bobak*, Russ. *babakŭ*). A gregarious marmot or woodchuck (*Arctomys bobac*) of Eastern Europe and Central Asia, which resembles the American prairie-dog in appearance and habits.

BOB'ADIL, CAPTAIN. A blustering, cowardly braggart, whose personality, lines, and fate form the most entertaining element in Ben Jonson's *Every Man in His Humour*. He lodges with Cob and Tib and is given to the use of 'dainty oaths.' His name has been thought to have been adopted from that of Bobadilla, Governor of Cuba, who sent Columbus back to Spain as a prisoner.

BOBADILLA, bō'bȧ-dē'lyȧ, FRANCISCO (? - 1502). A Spanish commander of the Order of Calatrava, appointed in 1499 to supersede Columbus as Viceroy of the Indies. He was fully empowered to conduct an investigation of the affairs of the Colony of Hispaniola, and set sail with two caravels from Cadiz in June, 1500. He was both insolent and inefficient, and he had no sooner landed in the island than he proceeded to high-handed and stupid demonstrations of authority. By his orders Columbus was seized, placed in chains, and sent back to Spain. The Admiral was, however, received with great consideration by the nation and Court. In 1502 Columbus set out on his fourth and final voyage, and arrived at Hispaniola on June 29. On the first of July, Bobadilla, who, after his utter mismanagement, had been recalled under arrest, left San Domingo in one of the vessels of a large fleet commanded by Torreş, and was drowned in a hurricane.

BOBBIN (Fr. *bobine*, of uncertain origin). A small wooden or metal roller, flanged at one or both ends, on which thread or yarn is wound for sewing, weaving, etc. Bobbins for weaving are commonly made with a flange at one end only, but most other forms of bobbins are flanged at both ends. The ordinary 'spool' on which sewing-thread is wound is a familiar example of a wooden bobbin, and the metal implement for holding the thread in a sewing-machine shuttle is a good example of a metal bobbin. The manufacture of bobbins, which are used in enormous numbers, is usually carried on by means of automatic machinery. In the manufacture of bobbins or spools for sewing-thread the wooden blocks, cut to the proper length, are thrown into the hopper of the machine, whence they are taken automatically, turned, flanged, bored, and discharged complete and ready for use. See SEWING-MACHINE; WEAVING; THREAD.

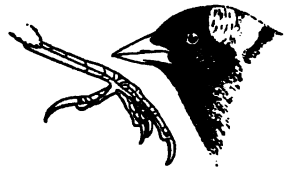
BOBBIN-BOY, THE. A boy's book, founded on the life of Gen. Nathaniel P. Banks, who was popularly called by this name, because, when a youth, he had spent several years working in a cotton-factory.

BOB'BINET' (*bobbin* + *net*). A machine imitation of pillow lace. (See LACE.) A fabric composed of hexagonal meshes, formed by a series of threads crossing and partially twisting around each other.

BOBBIO, bŏb'bē-ō. An episcopal city in north Italy, near the confluence of the Bobbio and the Trebbia, 37 miles northeast of Genoa (Map: Italy, D 3). In 612 Saint Columbanus founded an abbey here, whose famous library, consisting of 700 manuscripts, made known to the world by Niebuhr and others, is now partly in the Vatican, partly in the Ambrosian Library at Milan. Population, in 1881 (commune), 4500; in 1901, 4848.

BOBOLI (bō'bō-lē) **GARDENS.** Magnificent public gardens near the Pitti Palace, in Florence, planned in 1550, under the patronage of Eleanora of Toledo and the direction of the sculptor Tribolo.

BOBOLINK (earlier *boblincoln*, *Bob o' Lincoln*, *bob-o-lincon;* in imitation of the sounds produced by the bird). One of the most conspicuous and interesting song-birds of North America, found wherever plains, prairie meadows, or cultivated fields offer it a suitable home. It is a member of the Icteridæ, but stands apart from the orioles and blackbirds by reason of its pointed tail-feathers and long middle toe, as *Dolichonyx oryzivorus*. The length is about 7 inches, of which 2¾ inches go to the tail; the spring or breeding plumage of the adult male is black, with the hindhead and nape, scapulars, rump, and upper tail-coverts buff, inclining to ochraceous on the neck and ashy toward the tail; in this plumage a popular local name is skunk-blackbird. The female is protectively denied this gay suit, and is clothed in neutral yellowish brown, much streaked; and the young of both sexes wear a similar dress until the males mature. (See Plate of BLACKBIRDS.) Over the region of the dry Western plains and mountains, as far as the Salt Lake Valley, a paler form prevails, distinguished as variety *albinucha*. Such is the early summer gayety of plumage, when the males are rollicking above the fields where they are breeding in the Northern States and southern Canada, few stopping for that purpose south of latitude 40°. For their nests they choose open grassy spaces or fields of cultivated grass and grain; and as the spreading cultivation of the country has multiplied these conditions they have dispersed much more widely, especially in the East, than they originally extended, and for a long time vastly increased in numbers. Arriving from the South in May, a pair take possession of a field. The female constructs on the ground a nest of grasses skillfully entwined and often ingeniously hidden among the stems of the growing plants, in which are laid four or five eggs (see Plate of EGGS OF SONG-BIRDS), dull white, flecked and marbled with Vandyke brown, upon which she sits very closely for about a fortnight.



HEAD AND FOOT OF BOBOLINK.
Male in summer plumage.

During this nuptial season—from their first arrival until mid-July—the male is driving from the vicinity every intruder he can frighten away, especially rivals of his own kind, and making himself delightfully conspicuous by his gay activity upon the wing, and his loud, sprightly, and unceasing song, which has a peculiar ringing or *chinking* quality adapted to a rattling melody,

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seemingly uttered in an ecstasy too vivid to permit of any tune or modulation. It is to this the bird owes its name, which the poets have turned to Bob-o'-Lincoln, and played upon in many verses. As summer advances the black of the plumage of the male, which in reality is formed only by the tips of feathers, begins to wear off (see MOLTING), leaving the males in a rusty garb, which later becomes scarcely distinguishable from that of the females and young. Their brilliant song dwindles to the call-note, *Chink!* and in August the males gather upon marshy meadows in vast flocks, where they are gradually joined and followed by their families, and the southward migration begins. By the end of September all the bobolinks have left the northerly parts of the country, and are gathered upon southerly seacoasts or inland marshes. At this time they are fat, and along Chesapeake Bay and the Southern 'sounds' are shot in immense numbers under the name *reed-birds* as an autumn delicacy. Such as escape move on southward, where enormous flocks fall upon the ripening rice-fields of Carolina and the Gulf coast, where they are called *rice-birds*. Here they do very serious damage by eating the rice-grains, and more by shaking down a vast quantity, and armies of boys are set to shoot or drive them off—a process in which a great number of other quite innocent birds are also destroyed. So systematic and severe has been this persecution of late years that the species has been seriously diminished, and bobolinks are becoming rare in many parts of the northeastern United States and Ontario, to the sorrow of the people, who everywhere rejoice in the presence of this merry-andrew of the meadows.

BOBRINETS, bô-brē'nĕts. A thriving town in the Government of Kherson, South Russia, 120 miles north of the city of Kherson, on the high, rocky banks of a small river (Map: Russia, D 5). Flour-milling and retail trading are its principal industries. In the neighborhood of Bobrinets are interesting mounds. Population, in 1890, 10,050; in 1897, 14,350.

BOBRUISK, bô-brōō'ĕsk. A fortress of the first class and the capital of a district in the Government of Minsk, Russia, 108 miles southeast of the city of Minsk (Map: Russia, C 4). It is situated on the high right bank of the Beresina, at the mouth of its tributary, the Bobruisk, and is a station for the steam-packets navigating the Dnieper and Beresina. Its manufactures are less important than its commerce, which consists principally in exports of grain and timber. During the reign of Alexander I. it was fortified, and in 1812 it was ineffectually besieged by the French. Czar Nicholas I. converted it into a fortress of the first class. In 1902 it was almost totally destroyed by a conflagration. Population, in 1867, 24,700; in 1897, 25,100.

BOBRZYNSKI, bôb-zhĭn'skê, MICHAEL (1849—). A Polish historian, born at Cracow, in Galicia. In 1877 he was made professor of law in the University of Cracow. From 1885 to 1891 he was a member of the Reichsrat. His most important publications are his *Geschichte Polens* (1879), which aroused much criticism on account of its bitter attacks on Poland's past, and his contributions to Lencl's *Polnische Rechtsdenkmäler* (1874-82).

BOBS. A nickname given by his soldiers and by the English people to General Lord Roberts.

BOBSTAY. See SHIP.

BOB-WHITE. An American quail. See QUAIL.

BO'CA (Sp. *boca*, mouth, from Lat. *bucca*, cheek). A term applied to the entrance of various straits and rivers, chiefly in South and Central America. (1) *Boca Chica*, the channel 28 miles in length which leads to Cartagena, in Colombia. (2) *Boca de Navios*, the largest and most southerly outlet of the Orinoco. (3) *Boca Grande*, a bay of the Caribbean Sea, at the mouth of the Zucar, in Costa Rica. (4) *Boca del Toro*, in the Caribbean Sea, in Costa Rica, in latitude 9° 20′ N. and longitude 82° W. (5) *Boca Grande* and *Boca Chica* are the two channels connecting Darien Harbor with San Miguel Bay, Panama. The bays of Almirante and Chiriqui, in Panama, are connected with the Atlantic by the bocas del Drago, del Toro, and del Tigre.

BOCAGE, bô'kâzh', HENRI (1835—). A French dramatist, younger brother of Paul Bocage, who wrote comedies as well as fiction. Henri Bocage, though by profession an engineer, is the author, alone or with collaboration, of several pieces which were successful on the Paris stage. Among them may be mentioned the comedies *L'architecte de ces dames* (1869); *La canne de Damoclès* (1871); *Une fille d'Eve* (1875); *Les trois bougies* (1880); *En partie fine* (1884); and *La vie à deux* (1890); and the comic operas *La girouette* (1880), with music by Coedès, and *Les poupées de l'infante* (1881), with music by Grisar.

BOCAGE. PIERRE MARTINIEU JOUSEZ (1797-1863). A well-known French actor of the romantic period. He was born in Rouen, and had a hard struggle with poverty and obscurity before, in 1826, he secured an engagement at the Odéon. There he had some success, but later at the Gaîté and Porte Saint Martin theatres he found a more congenial opportunity in plays of a more melodramatic character, such as *Alice, ou les fossoyeurs écossais* and *Newgate, ou les voleurs de Londres*. In *Antony* and the *Tour de Nesle* he added so much to his reputation that he was engaged at the Théâtre Français. Among his greatest successes were those in *Angèle* and other pieces by Alexandre Dumas. From 1845 to 1848 he was director of the Odéon, and later (1860), for a time, of the Théâtre Saint Marcel. His final achievement was in the production, at the Ambigu, of *Les beaux messieurs de Bois-Doré* (1862).

BO'CA TI'GRIS (Portug. translation of Chinese *Hu-Mun*, the tiger's mouth or gate), or THE BOGUE. A passage in the Canton River, China, between the island of Tycocktow on the west and the islands of An-ung-hoi and Chuen-pi on the east. It is about 2½ miles wide, and below it the Canton River expands into a broad estuary. The Boca Tigris contains a number of small islands, with remnants of old forts, which were repeatedly taken by the British. At present the entrance is guarded by modern fortifications.

BOCAUE, bô-kou'â. A town of Luzon, Philippines, in the Province of Bulacan. It is situated about 4⅓ miles northeast of Bulacan, a short distance from the railway line (Map: Luzon, E 7). Population, 10,400.

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BOCCACCINO, bŏk'ä-chē'nō, Boccaccio (1460-c.1518). An Italian painter. He was born in Cremona, and was either a pupil or co-disciple of Domenico Panetti. Few facts of his life are known. Influenced by Mantegna, he painted a series of frescoes in Sant' Agostino, Cremona (1497), and afterwards kept a school in his native city, where Benvenuto Garofalo was one of his pupils. His most celebrated work is the frieze in the Cathedral of Cremona, representing the "Birth of the Virgin" and some subjects from her life. His remaining works, which include the "Marriage of Saint Catharine" (Venice Academy), the "Virgin and Child with Four Saints" (Venice, San Giuliano), the "Virgin and Two Saints" (Cremona, San Quirilo), and the "Holy Family" (Paris, Louvre), are considered by Lanzi remarkable for richness of drapery, variety of color, spirit and grace of attitude, and harmony of landscape. Several works formerly attributed to Perugino, Pinturicchio, and Vannucci are now ascribed to Boccaccino.

BOCCACCIO, bŏk-kä'chō, Giovanni (1313-75). The third great figure in Italian literature, who, lacking the inspiration of Dante and the perfect form of Petrarch, is remembered in the history of culture as the creator of a classic Italian prose, and, through the *Decameron*, as the father of the modern novel. In spite of recent critical studies, many details of his life are still obscure. It seems, however, generally conceded that he was the natural son of a Florentine merchant, Boccaccio di Chellino, and that he was born about 1313, in Paris, where his father was temporarily residing. Of his French mother little is known beyond the bare name, Giannina, which still survives in that of her son. His early boyhood was passed in Florence, but at fifteen he was already living in Naples, placed there, some say, with a mercantile firm by his father, who meant to make a merchant of him, like himself. But the gay life and natural beauty of the city only strengthened the lad's distaste for commerce, which he finally abandoned for the study of canon law at the Neapolitan University; but this proved scarcely more congenial. Meanwhile he was unconsciously laying the foundations of that knowledge of life and human nature which was to inspire his future work. Naples, under King Robert, had already become a centre of culture and learning, and Boccaccio, who seems to have had abundant pecuniary means at this time, soon formed valuable friendships with Niccolò Acciajuoli, who was later Grand Seneschal of the kingdom; with Paolo Perugino, the King's librarian, who taught him astronomy, and with many others. Many women also influenced his life in these early, impressionable years. Galla, Pampinea, Abrocomia, are some of the names which found a lasting record in his writings. But his one serious passion was that inspired by Maria, daughter of King Robert and wife of a gentleman of the Court circle, but celebrated by Boccaccio under the name of 'Fiammetta.' Unlike the loves of Dante and Petrarch, this passion was not destined to be an abiding influence in Boccaccio's life. Fiammetta quickly proved to be of a far less obdurate nature than Beatrice or Laura, and seems as quickly to have wearied of him and to have transferred her favors elsewhere. Yet she certainly influenced his literary career. His earliest work, the *Filocopo*, was written for her amusement; *Ameto* and *Fiammetta* both celebrate her charms; while some critics find much significance in the fact that the close of his activity as an imaginative writer coincides with the supposed date of her death. In 1340 he was recalled to Florence by his father, after which the scanty records give fugitive glimpses of him, first in one place and then another. In 1346 he is in Ravenna; in 1348 in Forli; then possibly back again in Naples; but at all events not in Florence during the terrible year of the plague, of which he has painted such a grim picture from hearsay. The loss of his father the following year devolved upon him the care of a younger brother, and the death of Fiammetta, which conjecturally soon followed, effectually closed the period of youthful indiscretion.

A strong influence for good, which at this time came into his life, was the friendship of Petrarch, whom it fell to his lot to entertain when the poet visited Florence in 1350; and the first of a series of public missions intrusted to Boccaccio by the city had for its object to petition Petrarch to make Florence his home. During this period he was deeply interested in humanistic studies. He busied himself with making copies of manuscripts of Terence and Apuleius, and resumed the study of Greek under Leonzio Pilato, for whom he secured a professorship at the University of Florence. At this time the revenues of the small estate left by Boccaccio's father failed to meet his necessities, and he went once more to Naples, drawn thither by the roseate promises of Niccolò Acciajuoli, now Grand Seneschal; but the promises were not fulfilled, and, giving ear to the exhortations of a dying priest, he returned to Florence, fully intent upon taking religious orders and retiring from the world, but was effectually dissuaded by Petrarch. In 1373 he received the last and most fitting honor that Florence was destined to confer upon him in the form of a charge to expound the *Commedia* in a series of public readings, for which he was to receive the yearly sum of 100 golden florins. It was practically the establishment of the first chair at any university for the study of Dante, and could not have been bestowed more worthily. The course was begun in October, but was soon interrupted, owing to failing health. Boccaccio retired to his small estate at Certaldo, where he died December 21, 1375.

Aside from the *Decameron*, Boccaccio's writings include: (1) The *Filocopo* (1338), his first and longest work of fiction, which may perhaps have fulfilled its purpose of amusing the Princess Maria, but which modern taste finds sadly tedious. Yet its curious and naïve conglomeration of pagan and chivalric legends, of classic mythology and mediæval Christianity, is at least amusing. It is also interesting as forming the transition from the metrical romance to the prose novel. (2) The *Filostrato* (about 1338) and (3) the *Teseide* (about 1341), two poems in the octave stanza, interesting to English readers as having formed the basis of Chaucer's *Knight's Tale* and *Troilus*. (4) *Ameto* (1341-42), the earliest modern example of the pastoral romance, in which a number of shepherdesses, Fiammetta among them, successively relate their adventures. (5) *Fiammetta* (about 1343), which is partially autobiographic, and really contains the first germ of the modern psychological novel. Boccaccio, however, has reversed

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their relative positions, representing Fiammetta as the one who is abandoned, so that the story becomes simply a personal record of her grief and sufferings. (6) *Ninfale Fiesolano;* (7) *Amorosa Visione;* and (8) *Corbaccio* — three minor works of uncertain date. (9) *Vita di Dante* (1364); and (10) numerous Latin poems and prose writings. The work, however, upon which his fame rests is the *Decameron*, a collection of 100 stories, supposed to have been told during ten successive days by a party of ten people who, to escape the plague, have retired to a charming retreat a short distance outside of Florence. The stories themselves are few of them original with Boccaccio. They are drawn from the French *fabliaux*, from classical or Oriental sources, from current folk-lore, and are pruned and polished and worked over in order to suit the spirit of the time and place and the supposed characters of the narrators. He went for his material and his inspiration mainly to the simple and homely humor of the people; he turned it, with an alchemist's touch, into literary gems, which in his own time won the plaudits of the most fastidious. The licentiousness of these stories has been, from his time to the present, a standing reproach against Boccaccio; yet allowance must be made for his age and his environment. He gave only what he found, and the chief interest which the *Decameron* possesses to-day is due to the fidelity with which it mirrors for us the life of his time and country, while in the delicate art of the short story—of clear, vivid, swift narration—he set a standard which has seldom been attained by those who have come since.

The *Decameron* has been translated into almost all modern languages, and has proved a useful mine for many a later author—Shakespeare, Molière, and La Fontaine among them. Of Italian editions, the earliest of all, the so-called "Deo gratias" edition, is without date; the second is dated Venice, 1471. Both are folios and both very rare. For biographies of Boccaccio, consult: Baldelli, *Vita di Giovanni Boccaccio* (Florence, 1806); Landau, *Boccaccio, sein Leben und seine Werke* (Stuttgart, 1877); translated by Antona-Traversi, much amplified (Naples, 1881); and Cochin, *Boccaccio, études italiennes* (Paris, 1890).

BOCCAGE, Manoel Maria Barbosa du (1765-1805). A popular Portuguese poet, born at Setubal. His admission to the army at the age of 14; his five years' service in the East Indies, with the rank of lieutenant; his return to Lisbon in 1790, where he soon became the most distinguished member of the circle of young poets known as the *Nova Arcadia;* his eager advocacy of the cause of the French Revolution, his arrest in 1797 and imprisonment for the revolutionary and atheistic tone of certain poems, notably his "Verdades Duras," and his death in 1805, complete the chronicle of his short and troubled life. The quality of Boccage's poems is extremely uneven. He had an unusual gift for improvisation, and wasted himself to a large extent upon verse of that sort, often upon the most frivolous subjects. Yet among his poems there are some of high order—sonnets that are little masterpieces of polished verse and amply justify the admiration of his contemporaries; while the popular and national spirit that animates them is the new note which he introduced into Portuguese literature, and which later found further expression in the younger national school led by Almeida-Garrett and Castilho. An excellent biography of Boccage, by Braga, forms the introduction to the latest edition of his poems (Oporto, 1876).

BOCCAGE, Marie Anne Fiquet du (Lepage) (1710-1802). A French poetess, remarkable chiefly for the praises she inspired as "Venus in form, Minerva in art." She was a member of the academies of Rome, Bologna, Padua, Lyons, and Rouen. She imitated Milton in *An Earthly Paradise* (*Paradis terrestre*) (1748), and wrote also miscellaneous *Poems* (1746), and *La Columbiade* (1756). Her letters to her sister while traveling in England, Holland, and Italy have still an interest quite absent from her verses.

BOCCALINI, bŏk'kâ-lē'nê, Trajano (1556-1613). An Italian satirist, born at Loreto. Under favor of Gregory XIII. he held several offices, the most important being that of Governor of Benevento. His principal work is his *Ragguagli di Parnaso* ("News from Parnassus"), in which he professes to give information regarding events in the Kingdom of Apollo. The work, which is full of cutting satire, enjoyed great popularity in its day, and was extensively translated. It probably exerted considerable influence upon Swift and Addison. Other works by Boccalini are the *Pietre del Paragone Politico*, and his *Commentaries Upon Tacitus*, which earned him, from Bentivoglio, the title of 'grande anatomista di Tacito.'

BOCCHE DI CATTARO, bŏ'kâ dê kät'tâ-rō. See Cattaro, Bocche di.

BOCCHERINI, bō'kâ-rē'nê, Luigi (1743-1805). An Italian composer and violoncello virtuoso. He was born in Lucca, February 19, 1743. He was the son of a contrabassist, who instructed him on the violoncello. Afterwards he studied in Rome, and traveled through Italy and Germany, playing in concerts with success. He went to Pa is (1768) and to Madrid (1769), and became composer and violoncellist in the Chapel of the Infante Don Luiz, which post he held until 1785. Owing to impaired health, he fell into poverty, and was aided by friends. Boccherini occupies a place in Italian music somewhat similar to that of Haydn and Mozart in German. His style is antiquated, but the simple melodies are still fresh in their naïveté and grace. His adagios and minuets are noted for their quaint beauty. Boccherini's quintets are famous. They are written for two violins, viola, and two violoncellos—an arrangement that has seldom been imitated; and they are noted for the difficulties of the first violoncello part, evidently written to display his ability as a virtuoso. He died in Madrid, May 28, 1805.

BOCCHUS, bŏk'kŭs (Gk. Βόκχος, *Bokchos*). King of Mauretania and father-in-law of Jugurtha. With Jugurtha he made war against the Romans, but afterwards (B.C. 106) delivered him up to Sulla, the quæstor of Marius (Sallust, *Jug.* 80-120; Plutarch, *Mar.* 8-32). — Bocchus (?—33 B.C.). A son of the preceding. In the early part of his career he reigned over Mauretania with his brother, Bogudes, and after assisting Cæsar in his war against the Pompeians in Africa was rewarded with a part of the king-

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dom of Massinissa. After the murder of Cæsar Bocchus sided with Octavianus and Bogudes with Antony; and during his brother's absence in Spain Bocchus usurped the sole government of Mauretania, in which he was confirmed by Octavianus. After his death his kingdom became a Roman province.

BOCHART, bō'shär', SAMUEL (1599-1667). A noted French Orientalist and Protestant divine. He was born in Rouen; studied in Paris, Sedan, Saumur, Oxford, and Leyden, and then became pastor of the Protestant church in Caen, where he remained for forty-two years. In 1629 he gained great reputation by his victory, in a public discussion of several days' duration, over the famous Jesuit Père Veron. In 1646 appeared his *Geographia Sacra*, and in 1663 his *Hierozoicon*, or Scripture zoölogy, to which he devoted many years of his life. In 1652 he was invited to Stockholm by Queen Christina, and went thither, accompanied by his friend Huet. Court life, however, did not suit him, and his visit was short.

BOCHNIA, bŏk'nĭ-ȧ. A town of Galicia, Austria-Hungary, situated about 24 miles by rail from Cracow (Map: Austria, G 2). It has in its vicinity extensive salt and gypsum mines, and is the seat of thriving industries and trade. Population, in 1890, 8849; in 1900, 10,049, including 2200 Jews.

BOCHOLT, bō'kôlt. A town in the Prussian Province of Westphalia, on the Aa, 35 miles west by south of Münster (Map: Prussia, B 3). It is known for its spinning and weaving of cotton, and manufactures hearths, leather, iron, and trimmed lumber. Population, in 1890, 13,000; in 1900, 21,200.

BOCHUM, bō'kụm. A town in the Prussian Province of Westphalia, about 9 miles east of Essen (Map: Prussia, B 3). It is a centre of the iron, steel, and coal industry of Westphalia, which gives employment to thousands of men. Bochum possesses five or six churches, a gymnasium and several other schools, and a theatre. The town owns its water-supply, a modern sewage system, and a slaughter-house. The city is governed by a municipal council of 24 members, electing an executive board of 7. (See GERMANY, paragraph on Local Government.) Population, in 1890, 47,601; in 1900, 65,600.

BOCK, KARL ERNEST (1809-74). A German anatomist and medical writer. He was born in Leipzig, studied at the University of Leipzig, and was appointed professor there in 1839. He wrote, in popular style, a number of successful and frequently translated works—such as *Handbuch der Anatomie des Menschen* (1838); *Lehrbuch der pathologischen Anatomie und Diagnostik* (1848), and *Bau, Leben und Pflege des menschlichen Körpers* (1900).

BOCK BEER. See BEER; and BREWING.

BÖCKING, bē'kĭng, EDUARD (1802-70). A German jurist of note. He was born in Trarbach, studied in Heidelberg, Bonn, Berlin, and Göttingen, and in 1829 was appointed professor of law in Bonn. He was deeply learned in historical jurisprudence, and prepared a number of valuable critical editions of legal classics. These include *Corpus Legum sive Brachylogus* (1829), (with Kleuze) the *Institutiones* of Gaius and Justinian (1829), and *Notitia Dignitatum Utriusque Imperii* (1839-50). His other works include *Römisches Privatrecht. Institutionen des römischen Civilrechts* (1862), and editions of the works of Ulrich von Hutten and A. W. von Schlegel.

BÖCKLIN, bĕk'lĭn, ARNOLD (1827-1901). A Swiss landscape painter. He was born in Basel, and studied in Düsseldorf (under Schirmer), in Brussels, Paris, and Rome. He returned to Germany in 1856, and lived in Hanover, and then in Munich, where Count Schack, afterwards his chief patron, was first attracted by his talent. In 1860 he was appointed professor at the newly founded art school in Weimar, but resigned in 1862 to revisit Italy, whence in 1866 he returned to his native Basel. In 1871-74 he was again in Munich, then made Florence his home until 1885, and returned there in 1892, having in the meanwhile resided in Zürich. Although an artist of the highest rank, he was understood by only a few, was often ridiculed even by his fellow artists, and never became popular. Endowed with wonderful creative power and a grandly picturesque imagination, he painted only what poetically interested and inspired him, caring little for the public, and while fantastic and sensational in the choice of his subjects, was always original in his design and fascinating in his manner of painting. Notable for his glorious color-tones and poetic apprehension, he was an exceptionally fine delineator of southern nature, but in his figures only too often seemed to be impelled by the wish to represent the eternal contrast between beauty and ugliness. Hence the most perfect and enjoyable of his creations are those in which the landscape portion preponderates and his landscapes pure and simple. Some of his most noteworthy pictures are: "Castle by the Sea Surprised by Corsairs," "Chase of Diana," both in Basel Museum; "Venus Reposing," "Pan in the Rushes" (Munich Gallery); "Villa by the Sea," "Centaur Struggle," "Panic Terror," "Anacreontic Shepherd Boy," "The Isle of the Blessed" (Berlin Museum). Most of his finest paintings are in private collections in Germany and Switzerland, the largest number of them in the Schack Gallery in Munich, among which is the "Sea Idyl," one of his most original compositions, and a great masterpiece from the coloristic point of view. Consult: Lehrs, *Arnold Böcklin, ein Leitfaden zum Verständnis seiner Kunst* (Munich, 1897); Heinrich Brockhaus, *Arnold Böcklin* (Leipzig, 1901).

BOC'LAND (AS. *bōcland*, bookland, charterland, from *bōc*, book, charter), or BOOKLAND. In Anglo-Saxon law, land held in free tenure by grant (i.e. deed or charter) from the Crown. It is contrasted with *folcland* (q.v.), or land held, without written title, by customary law. The term does not describe a particular form of tenure, feudal or non-feudal, nor was bocland necessarily allodial in the sense of being held absolutely and independently of any superior. It seems that the distinguishing characteristic of such a title was that it derived all its qualities and incidents from the deed or charter creating it. Folcland, being governed by the customary or common law, must have presented uniform qualities, as of heritability, alienability, etc. But every tenure of bocland might be different from every other. It might be inheritable or not,

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or inheritable only by a certain class of heirs. It might be alienable or not, or alienable only to a limited class of persons. It might be allodial, in the later meaning of that term, as free from the claims of any superior lord, or it might be held by a feudal tenure of the most restricted and burdensome sort. See ANGLO-SAXON LAW. Consult: Digby, *Introduction to the History of the Law of Real Property* (4th ed., Oxford, 1892); Pollock and Maitland, *History of English Law* (2d ed., Boston, 1899); Lee, *Historical Jurisprudence* (New York, 1900).

BOCQUILLON-WILHELM, bō'kē'yōn' vē'lăn', GUILLAUME LOUIS (1781-1842). A French musician. He was born in Paris, studied at the Paris Conservatory, was instructor in music at the College of Saint Cyr, and from 1810 professor of vocal music at the Lycée Napoléon (afterwards the College of Henry IV.). In 1835 he was appointed superintendent of vocal music in the public schools; in 1838 in the universities. The classes he thus organized, combined with the workingmen's evening classes later established, formed the basis of the Orphéon, whence was developed the French system of choral societies. He set to music Béranger's songs, and published a *Manuel Musical* (1846).

BOCSKAY, bŏch'kō-ē, STEPHEN (1556-1606). A Hungarian national leader. He was brought up at the Court of the Báthoris, and in 1604 headed the Hungarians in their revolt against Rudolph II. of Austria, who was aiming at the overthrow of Protestantism. After defeating the Imperial troops in several battles, he was proclaimed Prince of Transylvania (1605), was recognized as such by Sultan Ahmed I., and was also invested with the supreme power by the estates of Upper Hungary. In 1606 he concluded the peace of Vienna with Rudolph II., and thereby secured religious freedom to the Protestants of Hungary. Bocskay died soon after becoming Prince of Transylvania. Consult Szilágyi, *Monumenta Comitialia Regni Transylvaniæ* (Budapest, 1879).

BODE, bō'de, JOHANN ELERT (1747-1826). A German astronomer. When a boy he made astronomical observations from the garret of his father's house, with a telescope constructed by himself, and at the age of 18 calculated an eclipse of the sun. The next year he wrote on the solar eclipse of August 5, and an elementary treatise on astronomy which was especially successful. In 1776 he commenced the *Astronomisches Jahrbuch*, which is still continued. But his fame rests chiefly on the *Uranographia*, published in 1801, in which he included 17,240 stars, or 12,000 more than can be found in any previous charts. Bode reproduced the statement of the relations of the planetary distances, previously made known by Titus of Wittenberg, but afterwards called 'Bode's Law' (q.v.).

BODE, JOHANN JOACHIM CHRISTOPH (1830-93). A German musician and translator, born in Brunswick. He was at various times an oboist, instructor in music and languages, composer, editor, printer, and translator. His translations, including Burney's *Present State of Music in Germany*, *Tristram Shandy* (1774); the *Vicar of Wakefield* (1776), and the *Essais* of Montaigne (1793-97), had decided influence on German literature. Consult Böttiger, *Bodes litterarisches Leben* (Berlin, 1796).

BODE, WILHELM (1845—). A German art critic. He was born in the Duchy of Brunswick, and began his career as a lawyer. In 1869, however, he began the study of art and archæology in Berlin, and was made director of the Department of Christian Plastic Art at the Museum of Berlin in 1880, and finally director of the Picture Gallery (1890). His works, which deal chiefly with the Dutch masters and with Italian and German plastic art since the Middle Ages, are distinguished by their originality and judicious criticism. They include: *Studien zur Geschichte der holländischen Malerei* (1883); *Geschichte der deutschen Plastik* (Vol. II. of the *Geschichte der deutschen Kunst*, 1885); *Italienische Bildhauer der Renaissance* (1887); *Die Gemäldegalerie der Königlichen Museen zu Berlin*, with J. Meyer and H. von Tschudi (1888); *Rudolf Henneberg* (1895); *Rembrandt, Beschreibendes Verzeichnis seiner Gemälde, Geschichte seines Lebens und seiner Kunst*, with Hofstede de Groot (1897-1900); and *Kunst und Kunstgewerbe am Ende des 19. Jahrhunderts* (1901). He also edited the *Denkmäler der Renaissanceskulptur Toscanas*, published by Bruckmann (Munich, 1892, et seq.).

BODEN-SEE, bō'den-zā'. See CONSTANCE, LAKE OF.

BO'DENSTEDT, FRIEDRICH MARTIN VON (1819-92). A German poet and journalist. He was born in Peine, April 22, 1819, and educated for commerce; but forced his way to the university, studying in Göttingen, Munich, and Berlin, after which he lived three years as tutor in Moscow, making excellent translations of poems by Pushkin, Kazloff, and Lermontoff (1843). In 1843 he became instructor in the gymnasium in Tiflis, and in 1845 published a translation of Russian folk-songs under the title of *Poetische Ukraine*. In Tiflis he prosecuted Oriental studies under a Tartar teacher (Mirza Schaffy), and began the translations and echoes of Persian thought which, under the name 'Mirza Schaffy,' suggest FitzGerald's *Omar Khayyam*. Later he traveled widely in the Caucasus and the East, and as a result wrote *Die Völker des Caucasus und ihre Freiheitskämpfe gegen die Russen* (1848) and *Tausend und ein Tag im Orient* (1850). Poems from this book, with others, were collected as *Lieder des Mirza Schaffy* (1856). Their warm imagery, their sensuous joyousness, and their melodious charm claimed general applause. The book has passed through a hundred and fifty editions, and has been translated into nearly all European languages. A continuation, *Aus dem Nachlass das Mirza Schaffy* (1874), was more serious and less successful. Bodenstedt was for a time a very efficient director of the noted theatre in Meiningen. In 1881 he lectured in the United States. *Vom Atlantischen zum Stillen Ocean* (1882) is an account of this journey. His part in the translation of Shakespeare's works, undertaken by the German Shakespeare Society, is also noteworthy, as are his autobiographical *Erinnerungen aus meinem Leben*. He wrote many tales and some dramas, but his talent showed to greatest advantage in his translations and adaptations. He made himself a permanent place in German literature as the poet of Mirza Schaffy. Consult Stern, *Studien zur Litteratur der Gegenwart* (Dresden, 1895).

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BODENSTEIN, bō'den-stīn. See CARLSTADT.

BODE'S (bō'dez) **LAW.** An arithmetical relation which is supposed to establish a connection between the distances of the planets from the sun. It may be thus stated: Write, in the first instance, a row of fours, and under these place a geometrical series beginning with 3, and increasing by the ratio 2, putting the 3 under the second 4; and by addition we have the series 4, 7, 10, etc., which gives nearly the relative distances of the planets from the sun.

4	4	4	4	4	4	4	4	4
	3	6	12	24	48	96	192	384
4	7	10	16	28	52	100	196	388

Thus, if 10 be taken as the distance of the earth from the sun, 4 will give that of Mercury, 7 that of Venus, and so forth. The actual relative distances are as follows, making 10 the distance of the earth:

Mercury	Venus	Earth	Mars	Asteroids
3.9	7.2	10	15.2	26.5

Jupiter	Saturn	Uranus	Neptune
52.0	95.4	191.8	300.5

Close as is the correspondence between the law and the actual distances, except in case of Neptune, no physical reason has been given to account for it, and there is little probability that such exists. Bode's law, therefore, in the present state of science, is purely empirical. Kepler was the first to perceive the law, and Bode argued from it that a planet might be found between Mars and Jupiter, to fill up the gap that existed at the time in the series. The discovery of the asteroids has proved the correctness of this prediction. Similar relations, though expressed in different numbers, are found to subsist in the distances of the satellites of Jupiter and Saturn from their primaries; but these also are doubtless mere coincidences.

BODHISATTVA, bō'd'hē-sät'vä. In Buddhist theology, a person who is approaching the state of perfect knowledge.

BOD'IE, or **BOD'YS ISLAND.** A sand strip in Dare County, N. C., between Albemarle and Roanoke sounds and the Atlantic Ocean (Map: North Carolina, G 2). The sand is shifting in character, inlets from the ocean appearing and disappearing from time to time. Haghead, a popular seaside resort, is built upon the site of a former inlet of that name. There is a first order light in latitude 35° 49′ N., and longitude 75° 33′ W., at a height of 156 feet above sea-level.

BODIERON, bō'dĭ-ē'rŏn (origin obscure). The green rock-trout (*Hexagrammus lagocephalus*) of Puget Sound and northward, known to the Cape Flattery Indians as tsebarqua. It resembles other rock-trout, especially the boregat, but its flesh is greenish. See ROCK-TROUT.

BODIN, bō'dăn', JEAN (1530-90). A French writer on politics, born in Angers. He was a lecturer on law in Toulouse, and subsequently practiced as an advocate of the Parlement of Paris, before he devoted himself to the study of political theory. His exceptional talents, and the positive attitude he assumed in support of the doctrine of absolute monarchy, gained him the good will and protection of Henry III., and of his brother, the Duc d'Alençon. With all his leanings toward conformity in politics and religion, Bodin was an enemy of persecution, and his antagonism to the course adopted by the ultra-Catholics cost him the favor of his royal patrons. At the States-General of Blois in 1576, Bodin, as a representative of the Third Estate from Vermandois, succeeded in securing an interim of peace and toleration for the adherents of the Reformed religion. After the assassination of the Duke of Guise in 1588, Bodin joined the League, but was expelled not long after for his lukewarm Catholicity, and spent the rest of his life in retirement. He died in Laon in 1596. In his *Methodus ad Facilem Historiarum Cognitionem*, published in 1566, Bodin already gave evidence of a philosophical spirit and a deep store of learning; the appearance, ten years later, of his *Six livres de la république* assured him almost from the first the leading place among the political writers of the Renaissance, not even excepting Machiavelli. By his vast erudition and bold grasp on the principles underlying historical fact, Bodin, in the estimation of modern authorities, deserves a place with Aristotle and Montesquieu as one of the three greatest political philosophers in history. His most valuable contribution to the science of society and statecraft is the conception of sovereignty which he was the first clearly to formulate and to develop. Starting with the family as the unit of society, Bodin defines the State as a collection of families united by common interests and common possessions living under the right authority of a sovereign. This sovereign is described as power 'supreme and perpetual, absolute, and subject to no law.' The kinds of government are three: democracy, aristocracy, and monarchy or despotism, according as the sovereign power reposes in the mass of the people, in a few, or in one; mixed governments there can be none, since in the nature of things the sovereign is one and indivisible. Of the three forms of government Bodin much prefers monarchy, and inasmuch as he endows his ruler with all the gifts of Plato's philosopher-king, he finds it easy to bestow on him the full attributes of sovereignty. Custom, law, the will of the people as expressed through their parliaments and magistrates, are undoubtedly of great importance; but in the last instance, the King is subject to no restraint save that of his own conscience. Equally celebrated with his theory of sovereignty is Bodin's analysis of the effect of climate on society and government. In general he finds that the nations of the north are characterized by the predominance of physical strength, those of the south by mental power, those of the temperate zones by a happy mixture of the two. In the north, the dominant force is brute will; in the south, superstition; in the central regions, reason. The ideal commonwealth would embrace the entire world, in which the northern peoples should supply the workers and fighters, the southern peoples the priests, poets, and artists, and the inhabitants of milder climates the legislators, magistrates, and judges. The *Colloquium Heptaplomeres*, published only in 1847, is a plea for toleration. Seven men—a Roman Catholic, a Lutheran, a Zwinglian, a Jew, a Mohammedan, an Epicurean, and a Theist—debate on the subject of what is the true religion, and arrive at the conclusion that it is best for each man to live in accordance with his own belief, provided his creed be not opposed to public morality and the welfare of the State. Far ahead of his times in his liberality of view with regard

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to so many sides of life, Bodin belonged to the Middle Ages in his superstition. He devotes an entire book of the *Republic* to an erudite discussion of the influences of the planets on the affairs of men, and in his *Démonomanie* (1580) advocates the burning of wizards and witches. Consult: Baudrillart, *Jean Bodin et son temps* (Paris, 1853); Barthélemy, *Etude sur Jean Bodin* (Paris, 1876).

BODIO, bō'dyō, LUIGI (1840—). An Italian political economist and statistician. He was born in Milan and studied in Pavia and Pisa. In 1864 he was appointed professor of political economy at the Technical Institute, Leghorn; in 1867 professor in Milan, and in 1868 professor of statistics and commercial geography at the Venice Commercial School. In 1872 he became director of the National Statistical Bureau. He has published a considerable number of important statistical works, among which is *Sui documenti statistici del regno d'Italia* (1867).

BODKIN (origin obscure). An instrument used by women of antiquity to fasten up the hair at the back of the head. It was the method commonly adopted by the priests of Cybele, as well as by the female characters in Greek tragedy, the bodkin being highly ornamented. Silver bodkins are still worn in a similar way by the peasant girls of Naples. The term 'bodkin' is also applied to a sharp-pointed instrument for piercing holes in cloth, as well as to a blunt instrument, having an eye, and used for drawing tape or ribbon through loops, and it was at one time a very common name for a dagger.

BOD'LE, or **BOD'DLE**. An ancient copper coin in Scotland, in value the sixth of a penny sterling. The bodle is said to have been so called from a mint-master of the name of Bothwell.

BODLEIAN (bōd'lē-an) **LIBRARY**. The great library of the University of Oxford, England. The first library, the foundation of Humphrey, Duke of Gloucester, was destroyed by the fanaticism of Edward VI.'s Commissioners for the Reform of the University. Sir Thomas Bodley's was a restoration (1602), and his active quest of valuable publications was equaled by his munificence. Formally opened with great ceremony, November 8, 1603, it was the next year granted letters patent by James I., who himself gave it the name of its founder. One of Bodley's first acts was the presentation of a large collection of valuable books, purchased on the Continent at an expense of £10,000. Through his influence and noble example, the library was speedily enriched by numerous other important contributions. Among the earliest subsequent benefactors were the Earl of Pembroke, who presented it with 250 volumes of valuable Greek manuscripts; Sir Thomas Roe; Sir Kenelm Digby; and Archbishop Laud, who made a magnificent donation of 1300 manuscripts in more than twenty different languages. About 8000 volumes of the library of the famous John Selden also went to the Bodleian Library. General Fairfax presented it with many manuscripts, among which was Roger Dodsworth's collection of 160 volumes on English history. The first catalogue of printed books was published by the first librarian, Dr. James (1605). Among some of the important bequests of the Nineteenth Century were the collections of Richard Gough, on British topography and Saxon and northern literature; of Edmund Malone, the editor of Shakespeare; and of Francis Douce; also, the sum of £40,000, by the Rev. Robert Mason, the interest to be expended on books. By purchase, the library acquired some fine collections of Oriental, Greek, Latin, and Hebrew books and manuscripts. The Bodleian Library is particularly rich in biblical codices, rabbinical literature, and materials for British history. Along with the British Museum, it enjoys the right of receiving a copy of every book appearing in England. There are more than half a million bound volumes, 30,000 volumes of manuscripts, besides valuable pictures and relics. The buildings contain also many art treasures, as the Pomfret and Arundel marbles, and the Hope collection of portraits. One of its most interesting paintings is that of Sir Thomas Bodley, full length. There is also a marble bust of him. Members of the university who have taken a degree are admitted to the use of the library, a small addition to the matriculation fees and an annual payment being charged for the privilege. Literary men, properly recommended, are allowed to make extracts from the works in the library, which is usually open from 9 o'clock in the morning to 5 in the afternoon. Connected with the main library is now a circular structure called the Camera Bodleiana, the gift of Dr. Radcliffe, which is kept open from 10 A.M. to 10 P.M. It contains the more common books, and is used as a reading-room. The tercentenary of the foundation was celebrated with great splendor in the fall of 1902. Consult Macray, *Annals of the Bodleian Library* (Oxford, 1868).

BOD'LEY, Sir THOMAS (1545-1612). An English scholar and diplomatist, now best known through the Bodleian Library (q.v.). During the reign of Mary his parents were for a time in Geneva, where Thomas studied Greek, Hebrew, and divinity, the last with Calvin. The family returned on the accession of Elizabeth, and the son, entering Magdalen College, Oxford, was duly graduated B.A. in 1563, and was made a probationer fellow of Merton College. The following year he was made actual fellow, and in 1566 received M.A. For a while he delivered a Greek lecture, was in 1569 elected proctor, and on one occasion was public orator. Employed by the Queen in diplomatic missions, he was sent to the courts of Denmark, France, and Holland. He was proficient in the Continental tongues, and his diplomatic career was so distinguished that he was solicited to become Secretary of State, but the scholarly quiet of the Oxford life appealed to him more strongly, and he returned thither in 1596. Now relieved of public cares, he considered how he might "do the true part of a profitable member of the State," and the restoration of the library seemed to him a rare opportunity. He was fortunate in securing the hearty coöperation of his countrymen. Himself indefatigable, he had an agent go to the Continent and buy largely. He also permanently endowed the library, and in his will he made the university his chief beneficiary. Knighted by James I., he desired that he might be buried in keeping with his knightly rank, and accordingly directed that £666 13s. 4d. be expended for great ceremony. His remains were laid in the Chapel of Merton College. There, too, a monument was erected in 1615. Bodley's autobiography up to 1609, with

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his letters, was published under the title of *Reliquiæ Bodleianæ* (London, 1703). See BODLEIAN LIBRARY.

BOD'MER, CHARLES (1809—). A Swiss engraver, born in Zürich. His works include drawings, etchings, engravings, and paintings for books and magazines. His favorite subjects are the environs of Fontainebleau, where he lived. He received a medal at the Expositions of 1851, 1855, and 1863, and the Cross of the Legion of Honor in 1876.

BODMER, GEORG (1786-1864). A noted Swiss mechanic, born in Zürich. He was apprenticed to a mechanic in Hauptweil, and made valuable improvements in wool-spinning machinery in 1805. In 1808 he invented a cannon for firing bombs, which exploded upon striking. He continued to manufacture and improve industrial machinery and firearms, and in 1824 established large works in Manchester, England. Subsequently he turned his attention to railway construction in Austria.

BODMER, JOHANN JAKOB (1698-1783). A German-Swiss poet and critic. He was born in Greifensee, became professor in Zürich, and was chief mover in the emancipation of German literature from French classic tradition. He published, with Breitinger, a critical periodical *Diskurse der Maler* (1721-23), which attacked the then popular poets of the Silesian School. His æsthetic writings, especially *Vom Wunderbaren in der Poesie*, precipitated a literary war between him and the powerful Leipzig critic Gottsched (q.v.). While he at first hailed Klopstock as a worthy successor to Milton, he later on became involved in a personal quarrel with him, and he totally failed to appreciate the new development in German literature due to Lessing and Wieland. Schiller's *Räuber* he criticised unmercifully. He revealed, however, to Germany the beauties of the Minnesingers and of the Nibelungen, translated Milton's *Paradise Lost* and Homer, and did much to awaken in Germany an interest in English literature. Consult: Breitmaier, *Geschichte der poetischen Theorie und Kritik von den Diskursen der Maler bis auf Lessing* (2 vols., Frauenfeld, 1888-89); and Bächtold, *Geschichte der deutschen Litteratur in der Schweiz* (Frauenfeld, 1892).

BOD'MIN (from Cymr., Celt. *bod*, dwelling + *min*, high rock; or possibly *bod-manach*, dwelling of monks). The county town of Cornwall, England, 26 miles west-northwest of Plymouth (Map: England, B 6). It consists principally of one street a mile long. Its ancient church is one of the largest in Cornwall, but has been much injured through frequent restoration. It has an ancient grammar school, founded by Queen Elizabeth, a hospital, and the county lunatic asylum. Its chief trade is in cattle, horses, and sheep. Population, in 1891, 5100; in 1901, 5400. Bodmin arose in the Tenth Century, and was long an important place, having a priory, a cathedral, and thirteen churches. Consult *Guide to Bodmin and Neighborhood* (Truro, 1872).

BODONI, bô-dō'nê, GIAMBATTISTA (1740-1813). An Italian type-cutter and printer. The son of a printer, he was born in Saluzzo, Piedmont, and was successively a compositor in Rome and the superintendent of the Duke of Parma's private press. He was distinguished rather for his elegance than for his accuracy, and is best known by his editions of the *Iliad*, Vergil, and the Lord's Prayer, the last in 155 languages. Worthy of mention, too, is his *Manuale tipografico* (1818). He died in Padua. For his life, consult Bernardi (Saluzzo, 1873).

BODY, CHARLES WILLIAM EDMUND (1851—). An English theologian. He was born at Clapham, England, and was educated at Saint John's College, Cambridge. He was provost and vice-chancellor of Trinity University, Toronto, Canada, from 1881 to 1894. His principal publication is *The Permanent Value of Genesis* (one of the Paddock Lectures for 1884).

BODY, DEAD. See CORPSE.

BODY AND MIND. The question of the relation of body to mind, together with the deeper question whether we have a right to separate these two terms and to speak at all of a 'relation' between them, is subject-matter for metaphysical inquiry. We refer to the articles DUALISM; EPISTEMOLOGY; MATERIALISM; MONISM; SPIRITUALISM. Here we are concerned simply to discuss the views which have been adopted by psychologists as working hypotheses upon the scientific level, without regard to their ultimate metaphysical validity. Just as physics may postulate, for its own purposes, the existence of a matter which certain philosophical systems repudiate, so may psychology accept a theory of the relation of mind to body which some or all systems of philosophy would pronounce erroneous or inadequate. Every science must assume its data as realities, and has a right to its working hypotheses. And some sort of theory of the relation of mind to body has become a necessity for psychology, since Fechner (q.v.) has shown that the presupposition of an exact science of mind is the uniformity of mental response to physical stimulus.

Psychologists are, at the present day, sharply divided into two groups, the one holding a theory of the interaction of mind and body, the other a theory of psycho-physical parallelism. The former theory, which has all the weight of common opinion on its side, avers that mental processes are able to act causally upon bodily; that an idea may 'make' us act—i.e. condition bodily movements—just as truly as a blow may make us feel pain. The chain of events is made up of two kinds of links—material processes and mental processes; and the links are interchangeable and equally effective. The latter theory maintains that the two series, the material and the mental, are disparate; that they never pass into or interfere with each other. The mental series is conditioned upon the material, runs parallel with it, term for term; but there neither is nor can be any transition from the one to the other. It should be said, emphatically, that there is no necessary connection between the theory of interaction and a metaphysical monism or idealism, and none between parallelism and a metaphysical dualism or materialism. Either theory, held as a scientific working hypothesis, is compatible with any one of these ultimate metaphysical beliefs.

The main arguments for interaction are as follows: (1) "The particulars of the distribution of consciousness point to its being efficacious" (James). Consciousness can apparently 'load the dice' of the brain — i.e. can bring

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"pressure to bear in favor of those of its performances which make for the most permanent interests of the brain's owner." "Consciousness is only intense when nerve-processes are hesitant. . . . Where indecision is great consciousness is agonizingly intense." This argument squares with the doctrine of biological evolution, in that it gives to mind, which is a highly complex development, a survival value in the organism's struggle for existence. (2) A damaged brain may recover and work normally; the parts remaining take on the duties of the parts lost, by the principle of 'vicarious function.' The restoration is intelligible if consciousness direct it; unintelligible, if the brain machine be subject to no such direction. (3) Pleasures are associated with beneficial stimulation, pains with detriment to the organism. This correlation seems to imply that pleasures and pains exert a direct influence upon the bodily processes. (4) The assumption of the interaction of mind and body assures the universality of the causal connection and the uniformity of natural law throughout the known universe.

To the first argument there is the reply that it offers no proof of the actual interference of consciousness in the struggle for existence. Mind may be a mere concomitant of brain; a concomitant that varies in complexity as its physical substrate varies, and that is thus an index or symptom of brain-efficacy; but that is not itself a factor in survival. An animal may surpass its fellows, not because it has a better mind, but because (as its better mind shows) it has a better brain. The presence of an intense consciousness during deliberation and doubt offers no difficulty. (See ACTION; ANIMAL PSYCHOLOGY.) As for vicarious function, the developed brain is, by hypothesis, an exceedingly complex and plastic structure, not a machine definitely shaped for a few particular ends. Hence there is no need for the intervention of consciousness. The correlation of pleasure with stimuli that further life, and of pain with stimuli that thwart it, is readily explicable as a coincidence due to the continued operation of natural selection (Spencer). An animal that 'liked' to be hurt would not exercise any considerable influence upon the further development of its species. Finally, the demand for a universal causality is rather a metaphysical than a scientific postulate.

The arguments in favor of parallelism may be summed up as follows: (1) The hypothesis is a necessity for scientific psychology. If our psychological experiments, in which we submit the mind to various forms of physical stimulation, and observe the results, were liable to interruption by the reaction of mind itself upon the stimuli employed, there could be no hope of erecting 'laws' of mind, of discovering mental 'uniformities.' Our most laborious and careful researches might be upset at any moment by the interjection of some mental influence. The fact that laws and uniformities have been established indicates that the mental is conditioned, unequivocally, by the physical, and that there is no reciprocal conditioning. (2) The categories of mind and body are the most diverse of all that are recognized by science. They are entirely heterogeneous. But it is a rule of logic that one may not argue from category to category; reasoning is valid only within the limits of a single 'kind' or 'genus.' Hence we may not interpolate mental links in the chain of physical causation, and *vice versa*. (3) Reflex and secondary reflex movements show that the organism can act 'teleologically,' i.e. as if with set purpose and with a view to a determinate end, without the aid of consciousness. (4) The law of the conservation of energy requires that motion produce and be produced by motion; it forbids any arbitrary increase of the energy of the organism, such as must follow from the direct action of mind upon brain-cell.

The first of these arguments is difficult to meet. It rests upon a basis of positive fact; whatever our theoretical belief, we can but grant the utility of the parallelistic principle in the practice of experimental psychology. We might, however, urge that the heuristic value of a working hypothesis is no evidence that the hypothesis will endure. A proposition that appears self-evident at one stage of the history of a science may be utterly overthrown by later discovery. It may be, then, that as our experimental methods grow in refinement, and we attack the higher and more complex processes of mind, we shall gain evidence of the very mental action which now seems to be precluded by the results of experiment. The second argument is less strong. No formal considerations can limit the province of cause and effect; experience must decide in each case, irrespective of homogeneity or heterogeneity of the terms. The purposiveness of the reflex movements "proves only that the same effect can proceed from different combinations of conditions" (Stumpf). Moreover, it is probable that these movements are, one and all, degenerate impulsive actions (see ACTION); so that their teleology may, after all, be consciously conditioned. Lastly, there is no good reason why we should not rank 'mental energy' alongside of chemical, thermal, electrical, etc., energy, and assume that it, like these, has its precise mechanical equivalent.

We shall incline to the one side or the other, then, as our interests and experience prompt. The descriptive psychologist, keenly alive to the manifestations of mental life about him, and influenced by the traditions of psychological thought, will tend toward an acceptance of interaction; the experimental psychologist, revolutionary in temperament, and dominated by the methods of the laboratory, will tend toward a parallelistic theory. The impossibility of present decision may mean that we have not as yet sufficient facts at our disposal for a solution of the problem; or it may mean that the problem is wrongfully formulated, and will be transcended by a true philosophy. In either case, we must put our trust in time and further work. And, in the meanwhile, we shall do well to push to its logical extreme the hypothesis which makes the stronger appeal to us, for the clash of honest opinion is of the very greatest import for scientific progress.

BIBLIOGRAPHY. James, *Psychology* (New York, 1890); Stumpf, *President's Address, Bericht III. International Congress of Psychology* (1897); Ebbinghaus, *Psychologie* (Leipzig, 1897); Kuelpe, *Outlines of Psychology* (London, 1895); Titchener, *Outlines of Psychology* (New York, 1899); Wundt, *Human and Animal Psychology*

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(Eng. trans., London, 1896); Wundt, *Outlines of Psychology* (Eng. trans., 1898); T. H. Huxley, *Science and Culture* (New York, 1882).

BODY CASTLE. See ALMA.

BODY-COLOR. That material which contributes substance to pigments, more particularly the solid white known as Chinese White, used in water-colors, which by rendering them opaque distinguishes them from the transparent and fluid washes which mark the water-color method pure and simple.

BODY-SNATCHING. The common-law misdemeanor (q.v.) of unlawfully taking and carrying away a dead human body. When the body is taken from a grave the offense is commonly called *body-lifting*. The taking is ordinarily for the purpose of dissecting the body or selling it for dissection. By statute in many of the United States a person has the right to direct the manner in which his body shall be disposed of after his death, unless he is a convicted felon. In the latter case his body may be turned over to medical authorities for dissection. Statutes frequently provide also for the exhumation and dissection of buried bodies, under the direction of proper officers, for the purpose of discovering the cause of death. But the removal of a dead human body after burial, or while awaiting burial, if made without authority of law, with intent to sell or use it for dissection, is in nearly every jurisdiction a statutory or a common-law offense, punishable by imprisonment or a fine, or by both. While the law does not recognize a right of property in a human corpse, it does secure to the near relatives the right of controlling and of burying it, except in cases where public officials have the power to intervene. As a human corpse is not property, and as its prompt and decent burial is a legal as well as a moral duty, it cannot be attached, levied upon, or detained for debt. See CORPSE, and the authorities referred to under CRIMINAL LAW.

BOECE, bois, or **BOE'THIUS,** HECTOR (1465-1536). A distinguished Scottish historian. He was born in Dundee, and belonged to the family of Bois or Boyis, modern Boice or Boyce. He was educated in Dundee, and studied at the University of Paris, where he took the degree of B.D. He was appointed professor of philosophy at the Collège Montaigu, and acquired there the friendship of Erasmus, who has praised him in his writings. He left Paris reluctantly to preside over the new University of Aberdeen, the prosperity of which he greatly promoted. He also became canon of Aberdeen and rector of Tyrie. In 1522 he published his lives of the bishops of Mortlach and Aberdeen. His fame rests chiefly on his *History of Scotland*, published 1527, for which he received the degree of D.D. from the university and a royal pension. This work contains a large amount of fiction, but is worthy of the commendation it has received on the score of style. It is supposed that Boece died in 1536, for on November 22 of that year the King presented the rectory of Tyrie, vacant by the death of Mr. Hector Boiss, to John Garden. Consult: Irving, *Lives of Scottish Writers* (Edinburgh, 1839); and Burton, *History of Scotland* (Edinburgh, 1873).

BOECKH, bēk, AUGUST (1785-1867). A German classical scholar. He was born in Karlsrühe, November 24, 1785, and was enrolled as student in the University of Halle in 1803, where the lectures of F. A. Wolf (q.v.) induced him to devote himself exclusively to philology. In 1807 he became professor at Heidelberg, and in 1811 was called to the newly established University of Berlin, which owed much of its early fame to him, in company with Hegel and Schleiermacher. Boeckh lectured in Berlin with great success for over fifty years to a total of many thousand students. The range of his studies was very wide, and he was the first to develop philology on a philosophic basis. He conceived of that science as an organically constructed whole, which aims at nothing short of a complete intellectual reproduction of antiquity. His lectures therefore included both formal and historical grammar, exegesis, archæology, history of ancient literature, philosophy, politics, religion, and society. Boeckh's concept of philology excited much opposition at first, but gradually won adherents, and unquestionably gave a great stimulus to classical scholarship; at the present time, after many of the subjects which Boeckh regarded as subdivisions of philology have been exalted to the position of independent sciences, there are significant signs of a return to his general view of the unity of philology. His earliest publication, dedicated to Wolf, was *Commentatio in Platonis Minoem* (1806); in his *Græcæ Tragœdiæ Principum Æschyli, Sophoclis, Euripidis. Num Ea Quæ Supersunt Genuina Sint*, etc., published 1808, he discussed the possible revisions due to repeated productions and the interpolations of actors in the extant tragedies. He also produced some monographs on Plato while professor at Heidelberg.

His great works are the following: An edition of Pindar in 4 vols. (1811-22), the completion of which he intrusted to his friend G. L. Dissen (q.v.), professor in Göttingen. This marked an epoch in Pindaric studies by its criticism of the text and scholia, and especially by Boeckh's investigations on the metre. The introductory essay on the criticism of Pindar is still of great value. His work *Die Staatshaushaltung der Athener* (2 vols., 1817; 3d ed., edited by Fränkel, 1886) applied the methods of his master, Wolf, and of his older contemporary, Niebuhr, to questions of the commercial and State economy of the Athenians in a masterly manner; by it Boeckh established the science of public antiquities, in which he was followed by K. F. Hermann, G. F. Schoemann, and M. H. E. Meier (q.v.); and the work remains a permanent monument of thorough research, analysis, and vast learning. In his investigations Boeckh had been led to a careful study of Attic inscriptions. He now planned a comprehensive collection of Greek inscriptions, the cost of which was undertaken by the Berlin Academy. With Boeckh were associated Ph. Buttmann, Schleiermacher, Immanuel Bekker (q.v.), and later many others; the result of their work was the *Corpus Inscriptionum Græcarum* (4 vols., 1825-62). Among his other important works are *Philolaos' des Pythagoreers Lehre* (1819); *Metrologische Untersuchungen über Gewichte, Münzfüsse und Masse des Altertums* (1838); *Urkunden über das Seewesen des attischen Staates* (1840); *Sophokles Antigone* (2d ed., 1884); *Encyklopädie und Methodologie der philologischen Wissenschaften*, never published by himself, but edited from his lectures on

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the subject by Bratuscheck (1877; 2d ed., Klussmann, 1886). This is still the most important work in its field. His *Opuscula* fill 7 vols., (1858-74). He died in Berlin, August 3, 1867.

BOËDRO'MIOS (Help-giver). An epithet of Apollo, the origin of which is assigned to various events of Greek history. From this epithet was derived the name of the third Attic month, Boëdromion, corresponding to portions of September and October, on the 7th day of which the festival Boëdromia was celebrated in honor of Apollo.

BOEHLER, bē'lĕr, PETER (1712-75). A Moravian bishop. He was born at Frankfort-on-the-Main, Germany; studied at Jena, and in 1737 was ordained as a Moravian minister by Count Zinzendorf (q.v.). On his way to America, where he had been sent as a missionary to Carolina and Georgia, he stopped in England, and there became acquainted with John and Charles Wesley, over whom he had a powerful influence. He worked among the negroes in Georgia, and among the Germans in South Carolina, some of whom he ultimately transferred to Bethlehem, Pa. For a year Boehler labored as missionary to the Indians. He then went to Europe, and returned with a large number of Moravian colonists. This addition to the growing community at Bethlehem caused the founding of Nazareth, near the original town. In 1742 Boehler was appointed bishop of the Moravian churches in America, England, Ireland, and Wales. While on a parochial visit to his new charge he died in London. Consult T. P. Lockwood, *The Memorials of the Life of Peter Boehler* (London, 1868).

BOEHM, bēm, HENRY (1775-1875). An American Methodist minister. He was born in Lancaster County, Pa., and became a preacher in 1800. He was an intimate friend and associate of Bishop Asbury, and greatly contributed to the extension of Methodism, particularly among the German-speaking people of Pennsylvania.

BOEHM, Sir JOSEPH EDGAR (1834-90). An English sculptor. He was born in Vienna, but was educated in England, and lived there from 1862. He made careful study of the Elgin marbles and of copies of old masters in the galleries of the British Museum. In 1856 he won the first imperial prize in Vienna, and he gained a deservedly high reputation in England. In 1881 he was elected a member of the Royal Academy. Among his works are the colossal statue of Queen Victoria at Windsor, and statues of John Bunyan at Bedford, of Lord John Russel in Westminster Hall, London, of the Duke of Wellington at Hyde Park corner, and of Thomas Carlyle on the Thames embankment. Of the Carlyle, Ruskin, in his *Notes* for 1875, said: "Here is a piece of vital and essential sculpture; the result of sincere skill, spent carefully on a subject worthy of care."

BOEHM-BAWERK, bēm' bä'vĕrk. See BOEHM VON BAWERK.

BŒHME'RIA (after the German naturalist Böhmer). A genus of plants of the natural order Urticaceæ. The fibres of a number of species are used for making ropes, twine, nets, sewing-thread, and cloth, and some of them appear likely to acquire much economical and commercial importance. The commercially important species now known are *Bœhmeria nivea* and *Bœhmeria tenacissima*, the latter being often considered as merely a variety of the former. *Bœhmeria nivea* grows in temperate and subtropical regions, while the variety flourishes in sub-tropical and tropical countries. It yields a great part of the fibre employed in China in the manufacture of the beautiful fabric known as China-grass cloth (q.v.). It is a perennial herbaceous plant, with broad ovate leaves, which are white and downy beneath, and is of the general habit though destitute of the stinging powers of the nettles. It is carefully cultivated by the Chinese, by whom it is called *tchou ma*. It is propagated either by seeds or by parting the roots. It loves shade and moisture. Three crops are obtained in the season, new shoots springing up after it has been cut. Great attention is bestowed upon the preparation of the fibre. This is extracted by hand stripping, by boiling the stalks in water or some chemical solution, or by machinery. Machine methods have so far not met with unqualified success. On the other hand, the first-named two ways of extracting the fibre are more or less intricate and involve a large amount of hand-labor. As a consequence, the bulk of the fibre is produced in China and India, where cheap labor is plentiful. To *Bœhmeria nivea* properly belongs the name China grass; ramie or rhea should be retained for the plant which Dr. Roxburgh strongly recommended to attention about the beginning of the Nineteenth Century under the name of *Urtica tenacissima* (see RAMIE). An allied species, *Villebrunnea integrifolia*, is common in Nepal, Sikkim, and other parts of the Himalaya, to an elevation of 3000 feet above the sea. It is not cultivated, but often overruns abandoned fields. It grows to a height of 6 or 8 feet, and varies from the thickness of a quill to that of the thumb. The plant is cut down for use when the seed is formed, the bark is then peeled off, dried in the sun for a few days, boiled with wood-ashes for four or five hours, and beaten with a mallet to separate the fibres, which are called *pooah* or *poee*, and also *kienki* or *yenki*. When properly prepared, the fibre is quite equal to the best European flax. The fibres of a number of coarser species are employed in different parts of the East Indies for making ropes. The cultivation of *Bœhmeria nivea* has been introduced into the southern part of the United States, and with the invention of satisfactory methods of decortication and degumming it will doubtless prove an important industry. *Bœhmeria cylindrica* is indigenous in the United States, occurring as an annual in waste places from Canada to Florida and westward. See Royle, *Fibrous Plants of India* (London, 1865); Dodge, *Descriptive Catalogue of Useful Fibre Plants* (Washington, 1897).

BOEHM VON BAWERK, bēm fŏn bä'vĕrk, EUGEN (1851—). An Austrian political economist. He was born in Brünn, Moravia, February 12, 1851, was educated at the University of Vienna, and from 1872 to 1879 continued his study of political economy in Heidelburg, Leipzig, and Jena, under Knies, Roscher, and Hildebrand. He held for a short time a place in the Austrian Ministry of Finance, lectured in 1880, at the University of Vienna, but was called thence to the University of Innsbruck, where he remained till 1889. He then entered once more the Govern-

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ment service, in the department of finance, and was Minister of Finance from June 18 to October 2, 1895. He was then appointed professor in the University of Vienna and became president of one of the superior courts of administration. In 1897-98 he was again Minister of Finance; in 1899 he was called to the House of Peers, and since January, 1900, he has again been in charge of the Ministry of Finance. Boehm von Bawerk is one of the leading economists of the so-called Austrian school. With Karl Menger and others, he has contributed to the development of a theory of value which has received wide acceptance, and has been the cause of still wider discussion, in the economic world. This theory, as elaborated by Boehm von Bawerk, is based largely upon psychological principles. Its chief feature consists in a searching analysis of 'subjective value.' (See VALUE.) In his *Kapital und Kapitalzins* (1884-89), translated by Smart in 1890 under the title of *Capital and Interest*, the author makes a brilliant and original study of these two subjects. He does not accept the common classification of land, labor, and capital as the three sources of production, but regards the two former only as real sources, while capital is only a means of production. 'Interest' is employed as a general term for interest in the common sense, and for profits, and its cause and justification are found in the great principle of the difference in value between present 'goods' and future 'goods.' The term 'positive theory of capital' has been applied to the teachings of which Boehm von Bawerk on the Continent is the chief exponent, and which were discussed at great length in contributions to the *Quarterly Journal of Economics* from 1890 to 1895. Valuable articles on the subject are those by Bonar in the same publication on the "Austrian Economists" and on the "Positive Theory of Capital," Vol. III. (1889). See CAPITAL; INTEREST; JEVONS.

BŒO'TIA (Gk. *Βοιωτία, Boiōtia*). In ancient geography, next to Attica, the most important political division of Central Greece, bounded on the north by Locris and the Eubœan Gulf, on the east by the narrow strait of the Euripus, on the south by Attica, Megaris, and the Corinthian Gulf, and on the west by Phocis. Bœotia had a surface estimated at 1000 square miles. The plains inclosed on the south by Mounts Cithæron and Parnes, on the west by Mount Helicon, on the north by the slopes of Mount Parnassus and the Opuntian Mountains, fall naturally into two divisions—the basin of Lake Copaïs, now called Topolias, and that of the Asopus, together with the coast district on the Corinthian Gulf. The principal stream was anciently called the Cephissus. It entered the country from Phocis at Chæronea; and in the spring, when it was swollen by innumerable torrents, converted the Copaic plain into a shallow lake. There were underground channels for the outlet of the waters that congregated in this plain, but only four were active at the time the French engineers began work. To recover this valuable region to agriculture and remove the malarial marshes, extensive drainage operations were begun by a French company in 1883 and carried to a successful completion. The draining of the bed showed that similar works had been carried out by the Minyæ of Orchomenus in the Mycenæan period; a large dike ran along the north shore, collecting the waters of the Cephissus and Melas, and emptying them through a great natural subterranean passage. Another dike kept back the waters from the south shore, and brought them to the same outlet. A dike near the centre seems to have been connected with a system of irrigation. Forts secured the outlets against hostile attack. With the fall of the Mycenæan kingdom at Orchomenus, the works seem to have been neglected, and a change in the sea-level seems to have rendered the outlets useless, so that the region became again flooded. An attempt to clear out the old passages and open new ones was made during the reign of Alexander the Great, and there are traces of similar attempts later, but none with success. Bœotia in ancient times was a productive region, abounding in corn and fruits; marble, potters' clay, and iron were obtained, and it was also celebrated for flute-reeds. The inhabitants in the legendary age were the Minyæ of Orchomenus and the Cadmeans of Thebes, both Greek races and hostile to one another. Later, the country was occupied by the Bœotians, an Æolian people, who were driven from Thessaly. The Bœotians excelled as cultivators of the soil, and were gallant soldiers, both on foot and on horseback, but they were rude and unsociable, and took little part in the gradual refinement of manners and intellectual development of the rest of Greece, so that the name became proverbial for illiterate dullness. This was usually ascribed to their thick damp atmosphere. Yet there were not wanting among them eminent generals, as Epaminondas and Pelopidas; and poets and historians, as Hesiod, Pindar, Corinna, and Plutarch. The greater cities, of which the number was about fourteen, Thebes, Haliartus, Thespiæ, etc., with their territories, formed the Bœotian League. At the head of this were seven Bœotarchs, who held office for one year, commanded the army of the league and conducted its diplomacy, though the final decision in matters of policy seems to have rested with the four councils, concerning whose composition we are not informed. The internal history of Bœotia is largely concerned with the efforts of Thebes to maintain her leadership through this league against the efforts of Thespiæ, Orchomenus, and other cities for autonomy. The power of Thebes and the league was at its height in the years succeeding the battle of Leuctra (B.C. 371), when Epaminondas (q.v.) placed Thebes at the head of Greece. After the battle of Chæronea, in which Philip established the Macedonian throne on the ruins of Grecian liberty, the political importance of the country declined so rapidly that about B.C. 30 only two cities, Tanagra and Thespiæ, had any prominence. Bœotia now forms one of the nomes of the Kingdom of Greece. The capital is Livadia. Area, about 1550 square miles. Population, in 1896, 57,000. Consult: W. Rhys Roberts, *The Ancient Bœotians* (Cambridge, 1895); for the works in Lake Copaïs, E. Curtius, *Die Deichbauten der Minyer* (Berlin, 1892); and for topography, Ulrichs, *Reisen und Forschungen in Griechenland* (Bremen, 1840).

BOER, bōōr (Dutch *boer*, farmer, Ger. *Bauer*, peasant, Eng. *boor*, husbandman, rustic). The name given to the Dutch inhabitants of South Africa who are descended from the original settlers of Cape Colony. Separated for centuries from the rest of the world, these people, in their rude pioneer life, preserved their belief in the

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stern tenets of early Calvinism, a belief which colored their whole life. When, in 1814, Cape Colony was ceded by Holland to England, the English administrators failed entirely to understand the people with whom they had to deal, and they increased the hostility which the Dutch naturally felt for the English by their drastic legislation against practices which were a part of the religion as well as the life of these simple people, possessing many of the faults as well as many of the virtues of a primitive state of society. As a result there was a series of *treks* or emigrations, by which the more determined Boers sought to free themselves from British control. The first considerable movement of this kind was the 'great trek' of 1836. The Boers at first attempted to establish themselves in Natal, but they came into collision with the native Kaffirs, who were under British protection, and when Natal became an English colony they removed beyond the Drakenberg Mountains, taking possession of an extensive region on both sides of the Vaal, the principal affluent of the Orange River. Here they founded two states, the Transvaal or South African Republic, in the north, and the Orange Free State in the south. The Boers believed in their right to enslave the natives, and the abolition of slavery under English rule was one of the grievances that led to the *trek*. This attitude of the Boers won them the hatred of the native peoples. The Sand River Convention of 1852 between commissioners for the Cape Government and for the Boers gave autonomy to the Transvaal, with a reservation against the practice of slavery. The convention of Bloemfontein two years later brought the Orange Free State into being. The Boers have continued to be, for the most part, farmers clinging with the utmost conservatism to their antiquated religious ideas and their primitive mode of life. Their tenacity of purpose and stubborn independence in opposition to the British power in South Africa have won respect for the rugged virtues of their character, although the rudeness of the mass of this people seems to separate them from modern currents of life. The original roughness of the Boer character, however, has been greatly modified in the towns and among those Afrikanders who remained in the more cosmopolitan Cape Colony. For the later and more detailed history of the Boers, see CAPE COLONY; ORANGE RIVER COLONY; SOUTH AFRICA; and TRANSVAAL COLONY.

Consult also: Theal, *History of the Boers in South Africa* (London, 1888); David Livingstone, *The Transvaal Boers* (Edinburgh, 1881); F. W. Chesson, *The Dutch Boers and Slavery in the Transvaal* (London, 1869).

BOERHAAVE, bōōr'hä've, HERMANN (1668-1738). A Dutch physician. He was born at Voorhout, near Leyden. In 1682 he went to Leyden to become a clergyman, and studied Greek, Latin, Hebrew, Chaldee, ecclesiastical and secular history, and mathematics. In 1689 he was made doctor of philosophy, and in 1690 began the study of medicine. Though mainly self-educated in medicine—as in chemistry and botany—he gained his doctor's degree at Harderwyck, 1693, and returned to Leyden, where, in 1701, he was appointed lecturer on the theory of medicine. In his inaugural lecture he recommended to the students the ancient method of Hippocrates in medicine; but in 1703 his views had become greatly enlarged, and he elaborated various mechanical and chemical hypotheses to explain the diseases of the body, especially in the case of the fluids. In 1709 he was elected professor of medicine and botany in the place of Hotton. About this time he published the two works on which his great fame chiefly rests: *Institutiones Medicæ in Usus Annuæ Exercitationis Domesticos* (1708), and *Aphorismi de Cognoscendis et Curandis Morbis, in Usum Doctrinæ Medicæ* (1709), both of which went through numerous editions, and were translated into various European languages, and also into Arabic. In the first work—a model of comprehensive and methodical learning—he gives a complete outline of his system, including a history of the art of medicine, an account of the preliminary knowledge necessary to a physician, and a description of the parts and functions of the body, the signs of health and disease, etc.; in the second, he gives a classification of diseases, with their causes, modes of treatment, etc. Boerhaave also rendered important services to botany. Of his best lectures are those delivered on his resignation of the office of rector of the university, *De Comparando Certo in Physicis* (Leyd., 1714), and *De Honore Medici, Servitute* (1736). To combine practice with theory, he caused a hospital to be opened, where he gave clinical instruction to his pupils. Though so industrious in his own profession, he undertook, in 1718, after Lemort's death, the professorship of chemistry, and published in 1724 his *Elementa Chemiæ*, a work which did much to render this science clear and intelligible, and one that will always occupy a high place in the history of chemistry. His fame had meanwhile rapidly increased. Patients from all parts of Europe came to consult him. Peter the Great of Russia visited him; and it is even said that a Chinese mandarin sent him a letter, addressed 'Boerhaave, celebrated physician, Europe.' Consult: Burton, *Account of the Life and Writings of Boerhaave* (London, 1743); Johnson, *Life of Boerhaave* (London, 1834).

BOESWILLWALD, bēs'vĭl-vält, EMILE (1815-96). A French architect, born in Strassburg. He felt very early the reaction in favor of a return to the old French architecture, and joined Viollet-le-Duc and Lassus in their endeavor to restore the ancient models. So strong was the prejudice against anything Gothic that his drawings were refused at the Salon of 1840, but his talent was too evident to be long ignored. Three years afterwards he became one of the commission for the care of historic monuments, and as inspector-general of the commission was in charge of the excavations in Algeria and Tunis. His principal works are the restoration of the Cathedral of Luçon, and, with Dauban and Lassus, the restoration of the Sainte Chapelle. He was, in company with Viollet-le-Duc and Lassus, one of the inspectors of Notre Dame. Among his designs are those for a number of churches and public buildings in France and Spain. He was a member of the Institutes of London and Vienna. He received the cross of the Legion of Honor in 1865 and was made commander of the order in 1880.

BOËTHIUS, bō-ē'thĭ-ŭs, or **BOËTIUS,** bō-ē'shĭ-ŭs. See BOECE.

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BOËTHIUS, or **BOËTIUS**, ANICIUS MANLIUS TORQUATUS SEVERINUS (480-524). A Roman statesman and philosopher. The family to which he belonged had been distinguished for both its wealth and dignity for two centuries. His father, who held the office of consul, died when Anicius was still a boy, and consequently the latter was brought up under the care of Symmachus, whose daughter, Rusticiana, became his wife. It is known that he studied philosophy, mathematics, and poetry, translated and elucidated with laborious care the writings of Aristotle, and of the old mathematicians, Euclid, Archimedes, Ptolemy, and others; but the story of his eighteen years' stay in Athens is entirely unhistorical. Boëthius soon attracted notice; he became a patrician before the usual age, a consul in 510, and also *princeps senatus*. Having, moreover, gained the esteem and confidence of Theodoric, King of the Ostrogoths, who had fixed the seat of his government at Rome in the year 500, he was appointed by that monarch *magister officiorum* in his Court. His influence was invariably exercised for the good of Italy, and his countrymen owed it to him that the Gothic rule was so little oppressive. His good fortune culminated in the prosperity of his two sons, who were made consuls in 522. But his bold uprightness of conduct, springing from what seemed to have been the essential characteristics of the man—viz., a strong faith in the truth of his philosophic ethics, and a courage to regulate his official conduct by them—at last brought down upon his head the unscrupulous vengeance of those whom he had checked in their oppressions and provoked by his virtues. He was accused of treasonable designs against Theodoric; and the King, having become despondent and distrustful in his old age, was induced to listen to the charges. Boëthius was stripped of his dignities, his property was confiscated, and after imprisonment at Pavia, he was executed about 524, according to one account, under circumstances of horrible cruelty. During his imprisonment Boëthius wrote his famous *De Consolatione Philosophiæ*, divided into five books, and composed in the form of a dialogue, in which Boëthius himself holds a conversation with Philosophy, who shows him the mutability of all earthly fortune, and the insecurity of everything save virtue. The work is composed in a style which happily imitates the best models of the Augustan Age, and the frequent fragments of poetry which are interspersed throughout the dialogue are distinguished by their truthfulness of feeling and metrical accuracy. The *Consolatio* is piously theistic in its language, but affords no indication that Boëthius was a Christian; and if the doctrinal treatises ascribed to him are, as the acutest criticism maintains, not genuine, we must class him in religion rather with Marcus Aurelius than with his alleged friend Saint Benedict. He was the last Roman writer of any mark who understood the Greek language and literature. During the Middle Ages he was regarded with profound reverence, as the Augustine of philosophy, but on the introduction of the Aristotelian metaphysics in the Thirteenth Century his reputation gradually sank. The first edition of Boëthius's entire works appeared at Venice, 1491-92; standard edition of the entire works in Migne, *Patrologia Latina*, Vols. LXIII.-LXIV. (Paris, 1860). The oldest edition of the *Consolatio* is that published at Nuremberg, 1473, but many manuscript translations into various languages had appeared long before the invention of printing. Among these may be mentioned that by King Alfred into Anglo-Saxon, and by Chaucer and Queen Elizabeth into English. Best edition by Peiper, Leipzig (Teubner), 1875; a new translation by James (London, 1897). Consult also Stewart, *Boëthius: An Essay* (Edinburgh, 1891). The most interesting question in connection with Boëthius's mathematical works relates to his knowledge of Hindu numerals, characters evidently derived from them appearing on the apices or small cones used on the abacus. A discussion of this question may be found in Cantor's *Geschichte der Mathematik*. Consult also A. Hildebrand, *Boëtius und seine Stellung zum Christenthum* (Regensburg, 1885).

BOETTI, bō-ĕt'tē, GIOVANNI BATTISTA (1743-98). An Italian adventurer whose place of birth is unknown. After a series of remarkable adventures Boetti, under the title of an emissary of Mohammed, put himself at the head of a small army, and within a year subdued Kurdistan. He afterwards engaged in war with the Russians, by whom he was finally taken prisoner. He died in captivity on the island of Solovetsk, in the White Sea.

BOETTICHER, bĕ'tĭk-ĕr, P. A. DE LAGARDE. See LAGARDE.

BŒUF BAYOU, bĕf bī'ōō. An overflow stream in Arkansas and Louisiana, fed in time of inundation by the Mississippi. It unites with the Washita River, and at high water affords 100 miles of steamboat navigation.

BOF'FIN, NICODEMUS. A character in *Our Mutual Friend*, by Dickens. He is residuary legatee of his employer, but gives up the £100,000 when Harmon marries Bella Wilfer.

BOFFIN'S BOWER. The name given by Mrs. Boffin, in Dickens's *Our Mutual Friend*, to the place she made her home, as being more cheerful than its original of Harmon's Jail.

BOG (Gael. *bogan*, quagmire, Ir. and Gael. *bog*, soft, moist). Wet land covered with moss, and often underlain by it to a variable depth. Owing to the spongy character of the material, bogs are often saturated with water and converted into a kind of quagmire. The term 'peat-bog' is especially applied to those swamps or bogs which are underlain by an accumulation of peat, a vegetable gathering caused largely by the growth and decay of sphagnum, or bog-moss. Peat-bogs are especially abundant in the north temperate regions, much of Ireland and portions of England, as well as northern Germany, Nova Scotia, and Canada being covered by them. Tradition reports that at the battle of Solway, in 1542, a fugitive troop of horse plunged into the moss, which instantly closed in upon them; and in the end of the Eighteenth Century this tradition was confirmed by the discovery, made during peat-digging, of a man and horse in complete armor.

Bogs often originate by a process of lake-filling, ponds or even estuaries being partly filled by the inwash of sediment and partly by the spread of bog-mosses from the shore into the ever-shallowing water. As soon as one layer of bog-moss decays another growth springs up. A distinction is sometimes made between red

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bogs and black bogs, the former being filled by vegetable matter in a more advanced stage of decomposition. It is said that the red bogs of Ireland cover 1,500,000 acres. The term 'climbing bogs' is applied to those formed on hillsides, the supply of moisture being kept up by mountain springs. In many regions the peat is dug and utilized for fuel. When properly treated, bogs also yield arable land of much value. The reclamation of bogs for farming purposes involves the proper drainage of the area, and the plowing up of the soil in order to aërate it and bring about the necessary oxidation processes. In some cases clay is plowed in, although this requires time and expense. Oats are usually the best first crops. In Devon many bogs are cultivated as grass-meadows. In many localities in Great Britain the people have used 'pattens'—boards fastened upon the soles of the feet—for walking over bogs.

The bog-oak is a tree favoring peat-bogs; the wood of the tree is black and dense, and is used for carvings. The word bog is of Irish origin, being from a Gaelic root that signifies a bobbing, quaking motion. See BENT GRASS; WASTE LANDS; PEAT; SPHAGNUM; MARSH.

BO'GAARD, MARTIN VAN DEN. See DESJARDINS, MARTIN VAN DEN BOGAARD.

BOGAERS, bō'gärs, ADRIAAN (1795-1870). A Dutch poet, born at The Hague. He studied linguistics, and there were published two posthumous volumes of his, entitled respectively, *Taalkundige opstellen* (Philological Papers, 1872) and *Woordenboek op de dichtwerken van Bilderdijk* (Lexicon of Bilderdijk's Poetical Works, 1878). Better known, however, are his poems *De Togt van Heemskerk naar Gibraltar* (The Voyage of Heemskerk to Gibraltar, 1842) and *Jochebed* (1861). His collected poems have been edited by N. Beets (Haarlem, 1871).

BO'GAN, or NEW-YEAR RIVER. The Allan Water of Oxley, an interior stream of east Australia, joins the Darling after a generally northwesterly course of more than 300 miles, about latitude 30° S. and longitude 146° E. Its source is in the Harvey range, about latitude 33° S. and longitude 148° 30′ E.

BOGAR'DUS, ANNEKE. See JANS, ANNEKE.

BOGARDUS, EVERARDUS (? -1647). A minister of the early Dutch Reformed Church in New Amsterdam, the second minister in the colony. In 1638 he married Anneke Jans, a widow, who owned 60 acres of land in what is now an important business part of New York. The farm subsequently came into possession of Trinity Church and up to 1847 was the occasion of many lawsuits for recovery by the descendants of one of the heirs of Anneke Jans and Bogardus. In 1647 Bogardus sailed for Holland to answer certain charges made by his ecclesiastical superiors, but lost his life by shipwreck in Bristol Channel. See JANS, ANNEKE.

BOGARDUS, JAMES (1800-74). An American inventor. He was born in New York, and became a watchmaker and engraver. His inventions include the eight-day, three-wheeled chronometer clock, and other improvements in timepieces; the ring-flyer for spinning cotton; the eccentric mill, in which both stones run the same way, but with different speed; an engraving-machine; a transfer machine for producing bank-note plates from separate dies; the first dry gas-meter; the first pencil-case without a slot; a medallion engraving-machine; a machine for engine-turning; an improved method for making postage-stamps, etc.; a machine for pressing glass; several machines for cutting and working india-rubber; a new pyrometer; a dynamometer; and other contrivances of less importance. In 1847 he erected in New York for his factory a cast-iron building, the first one of that material ever erected. Soon afterwards he introduced wrought-iron beams.

BOG-ASPHODEL. See ASPHODEL.

BOG-BUMPER, BOG-JUMPER, or **BOG-PUMPER.** Names for the bittern.

BOG-BUTTER. An organic compound which has been found in the bogs of Ireland, and is known mineralogically as *Butyrellite*. Its properties and chemical composition led to the supposition that it was of vegetable origin, and had been formed by the decomposition of the peat in which it was found, especially so in consequence of its general resemblance to mineral resins, such as asphalt and bitumen. However, a thorough examination by McAdam in 1885 seemed to demonstrate its animal origin, as all of the samples analyzed showed the presence of hairs that were microscopically identical with those of a cow. It is probably safe to say that it is a variety of adipocere—i.e. that it was formed by the decomposition of animal matter out of contact with the air. It resembles butter in color and consistency, and becomes liquid at 51° C. (123.8° F.).

BOGDANOVITCH, bŏg'dă-nō'vĕch, IPPOLIT FEODOROVITCH (1744-1803). A Russian poet, born at Perevolotchna, Little Russia. His fame rests entirely upon his poem *Dushenka*, published in 1773. The story of Psyche forms the groundwork of the poem, which is characterized by a refined and graceful style and vivacious playfulness of language. Its publication made him famous, as well as obtained for him the high favor of the Court; but there can be no doubt that the popularity of the work was as much owing to the adventitious circumstances in which it was produced—nothing of the kind having been previously attempted in Russia—as to its intrinsic merits. Though he wrote much afterwards, he never equaled his first performance.

BO'GERMAN, JAN (1576-1637). A Dutch theologian, born at Oplewert, East Friesland. He actively participated in the Arminian controversy, was in 1618 president of the Synod of Dort, and in 1633 became professor of divinity at the University of Franeker. In addition to his translation of the *De la punition des hérétiques* of Beza as *Van Let Ketter straffen* (1601), he published the polemical *Annotationes contra H. Grotium*. He prepared, in collaboration with four others, a vernacular translation of the Bible. This rendering, of which the Old Testament was for the most part by him, continues to be the common Dutch version.

BO'GERT, GEORGE H. (1864—). An American artist, born in New York City. He was a pupil at the National Academy of Design, and afterwards went to Paris, where he studied under Puvis de Chavannes, Aimé Morot, and E. Boudin. He obtained the Webb prize for landscape in 1898, the first Hallgarten prize in

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1899, and a bronze medal at the Paris Exposition of 1900. Mr. Bogert has confined his brush entirely to landscape.

BOGGS, CHARLES STUART (1811-88). An American naval officer, born in New Brunswick, N. J. He entered the United States Navy as a midshipman in 1826, became a lieutenant in 1837, served in Commodore Conner's squadron during the Mexican War; distinguished himself under Farragut at New Orleans, in April, 1862, and the same year was raised to the rank of captain. In 1870 he became a rear-admiral, and three years later was retired.

BOGGS, FRANK M. (1855—). An American artist, born in Springfield, Ohio. He studied at the Ecole des Beaux Arts in Paris, and afterwards under Gérôme. In 1885 he was awarded a prize of $2500 at a competition in New York City for his "Rough Day at Honfleur," bought by the Boston Museum of Fine Arts. He was awarded a silver medal at the Paris Exposition of 1900. Mr. Boggs is represented at the Luxembourg Museum by a fine painting, "La Place de la Bastille," which was bought by the French Government in 1882.

BÖGH, bĕg, ERIK (1822-99). A Danish writer. He was born in Copenhagen, and first won a considerable reputation with his dramas, exceeding one hundred in number, and published collectively as *Dramatiske Arbeider*, 7 vols. (1858-71). He also published a volume of *Digte* (1855), and several prose works, including *Huldrebakken* (1852); *Kalifen paa Eventyr* (1857); *Hundrede Viser* (1862); and *Mester Olcs Praediken* (1877). His style is in general characterized by finish rather than originality.

BOGHAZ-KIEUL, bō'gäz kyĕ'ĕ, or **KÖI,** kĕ'ĕ. A village of Asia Minor in the Vilayet of Angora, about 17 miles from the town of Yozgad, in latitude 40° 1′ N. and longitude 34° 35′ E. The modern village is insignificant, but the heights near by contain many ancient ruins and a number of remarkable sculptures. The place was an important seat of Hittite civilization, and fragments of pottery seem to show intercourse with the Mycenæan lands. For a description of the remains and drawings of the sculptures, consult Van Lennep, *Travels in Asia Minor* (London, 1870); and for the recent excavations, E. Chantre, *Mission en Cappadoce* (Paris, 1898), whose statements as to a Babylonian colony must be received with caution; consult also Hall, *Oldest Civilization of Greece* (London and New York, 1901). The common identification with the ancient Pterium has recently been rendered doubtful by the explorations of Dr. Belck.

BOGHEAD COAL. A bituminous coal of Scotland, more valuable for making gas than for fuel. The coal is named from the chief place of deposit, Boghead, Linlithgowshire. See COAL.

BOG-IRON ORE. A name applied to deposits of limonite (hydrous ferric oxide) that are often found in alluvial soils, bogs, meadows, lakes, etc. It is abundant in some of the northern and western islands of Scotland and in the northern countries of Europe generally; also in North America. Sometimes the ore accumulates with great rapidity; thus, in some Swedish lakes a layer half a meter thick accumulates every fifteen to thirty years. Its constituent iron is dissolved out from the rocks by spring-water, from which it is precipitated in an insoluble form when exposed to the air. The amount of iron oxide in the ore commonly ranges from 40 to 50 per cent.; phosphoric acid is usually present in quantities varying from 2 to 11 per cent.; silica, alumina, oxide of manganese, and other substances make up the rest. The color of the ore is brown—either yellowish brown or blackish brown. Some varieties are earthy and friable and are formed of dull, dusty particles; others are in masses with an earthy fracture, often vesicular; still others are more compact and have a conchoidal fracture. The ore is often mixed with so much clay and sand that these have to be separated by washing before the ore can be used. Owing to the low percentage of iron, the commercial value of bog-iron ore is rarely very high, although the quality of the iron yielded is good. Bog-iron ore, which contains much clay and has a uniform color, is sometimes used as a paint. See MINERAL PAINTS; IRON; and LIMONITE.

BOGIŠIC, bō'gē-shĭch, BALTHASAR (1840—). A Slavic jurist. He was born in Ragusavecchia (Dalmatia), and studied in Vienna, Berlin, and Paris. In 1869 he was appointed professor of the history of Slavic law at Odessa, and was then charged with the task of elaborating a code of civil laws for Montenegro. In 1893-99 he was Minister of Justice in Montenegro. He has published several important studies, such as *Compilation of Legal Usages among the Southern Slavs* (1874), and *Aperçu des travaux sur le droit contumier en Russie* (1879).

BOG-MOSS. See SPHAGNUM.

BOGNOR, bŏg'nĕr. A popular seaside resort in Sussex, England, on the English Channel, 5½ miles southeast of Chichester (Map: England, F 6). It has a fine pier and esplanade. Population, in 1891, 4600; in 1901, 6200.

BOGNOR BEDS. See LONDON CLAY.

BO'GO. A seaport town of Cebu, Philippines, situated 69 miles north of Cebu. It has a good harbor and a population of 16,400.

BOGODUKHOV, bō'gō-dōō'kŏf, or **BOHODUKHOV.** A fortified town of Russia, capital of a district in the Government of Kharkov, 40 miles northwest of the city of that name (Map: Russia, E 4). A town of some commercial significance until 1820, it has now lost all of its importance owing to new railways which have transferred its trade to other towns. Tanneries and flour-mills are the only industrial establishments. Population, in 1897, 12,000.

BOGOLYUBOFF, bō'gō-lyōō'bŏf, ALEXEI (1824-96). A Russian painter. He was born at Pomerano (Novgorod), studied at the Imperial Academy of Design in Saint Petersburg, and under Achenbach in Düsseldorf, and in 1861 was appointed a professor at the Saint Petersburg Academy. He is best known for his marine views and sea-battles, including "Battle of Sinope" (1853); "Peter the Great with his Galleys"; and "Roadstead of Cronstadt" (1878).

BOG'OMILES. A religious sect which came into notice in the Twelfth Century, whose chief seat was in Thrace. They resembled the Paulicians and Cathari. Their name, if derived from the Slav. *Bog*, 'God,' and *miluy*, 'have

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mercy,' may perhaps refer to the frequency of their prayers; but more likely it comes from Bogomil, the name of their founder. The basis of their creed was as follows: Out of the eternal divine essence or being sprang two principles—Satanael and Logos; the former, at first good, afterwards rebelled, and created in opposition to the original spiritual universe a world of matter and human beings. These human beings, however, received from the Supreme Father a life-spirit; but this was kept in slavery by Satanael until the Logos or Christ came down from heaven, and, assuming a phantom body, broke the power of the evil spirit, who was henceforth called only Satan. The Bogomiles, like all similar sects, practiced a severe asceticism, despised images, and rejected the sacraments. Instead of baptism, they placed their hands and an apocryphal Gospel of Saint John on the head of the neophyte, singing at the same time the Lord's Prayer, which they repeated seven times during the day and five times during the night. They accepted the whole of the New Testament, but of the Old Testament only the Psalms and Prophets, which they interpreted allegorically. In 1118 that vehement hater of heretics, Alexius Comnenus, burned their leader Basilius. Persecution, however, did not put an end to the Bogomiles, and at the time of the Mohammedan conquest of Bosnia (Fifteenth Century), we find that the greatest number of the renegade Christians who embraced the religion of the conquerors belonged to this sect. There are some Bogomiles even at the present day. Consult Heard, *The Russian Church and Russian Dissent* (New York, 1887).

BOGORODSK, bō'gō-rôtsk'. The chief town of a district in the Government of Moscow, Russia, 52 miles east-northeast of the city of Moscow, on the Klyazma, and on a branch of the Moscow and Nizhni-Novgorod Railway (Map: Russia, E 3). It carries on a prosperous trade in silk and cotton fabrics, produced in the mills of the district, and in woolens, brandies, and liquors manufactured in the town. Population, in 1888, 2470; in 1897, 11,200.

BOGOS, bō'gōz. An Abyssinian tribe inhabiting the highlands north of Abyssinia, about Keren. They speak a Hamitic language called Bilin, which is akin to the Agau, though Tigré is very generally understood among them. Their name, Bogos, means 'robber.' They are slightly above the medium stature, rather robust, and in color reddish-brown, betraying an admixture of negro and other blood. Primarily they belong to the Hamitic group. They are largely nomadic and pastoral. Nominally the Bogos are Christians, but the Christian religion has no very strong hold upon them. Their territory was for a long time an object of dispute between Egypt and the Abyssinian kings. It now forms a part of the Italian colony of Eritrea. For an account of the Bogos, consult: Munzinger, *Ostafrikanische Studien* (Schaffhausen, 1864); Brinton, *Races and Peoples* (New York, 1890).

BOGOSLOV, bō'gō-slôf'. A volcanic islet off the northwest coast of Unalaska in the Aleutian Islands, Alaska, U. S. It was formed by a volcanic upheaval in the year 1796. It is a haunt of sea-lions.

BOGOTÁ, bō'gō-tä' (under Spanish rule Santa Fé de Bogotá). The capital of Colombia and an archiepiscopal city situated on a plateau, 8700 feet above sea-level, at the western base of the Guadalupe and Monserrate mountains, in the eastern Cordillera of the Andes (Map: Colombia, C 3). The plateau is surrounded by high mountains on all sides, except to the southwest, where the river Bogotá or Funcha cuts a narrow channel through a rocky precipice, on its way to the Magdalena, and 14 miles from the city leaps from a height of over 475 feet, forming what is called the fall of Tequendama. The climate of Bogotá is moist and moderate, the temperature varying between 57° and 61° F., with two rainy seasons each year. The city is regularly laid out, is rhomboidal in shape, and occupies an area of 6 square miles, measuring 3⅛ miles from north to south, and half that length from east to west. The city is divided into four parts by the San Francisco and San Augustin rivers, which are crossed by twenty bridges. The streets cross at right angles, are broad, well paved, and well shaded. Around the principal square, la Plaza de la Constitución, or de Bolivar, are the Government buildings and the cathedral, a magnificent edifice in the Corinthian style. In the middle is the bronze statue of Bolivar by Pedro Tenerani. The city possesses two theatres, a museum of natural history and antiquities, a national university, a public library of more than 50,000 volumes, a mint, and an observatory. The museum and library are situated in a former Jesuit monastery. The museum contains many interesting specimens of Inca civilization, and the library has a rich collection of plants and national literature. There are many churches and convents, and in the former may be found paintings by Murillo, Spagnoletto, and Vasques. The city is governed by a municipal council that elects the mayor and also the police inspectors of the wards (barrios), while one of the President's secretaries is the governor of the department.

Besides the national university there are colleges and schools giving instruction to more than 10,000 children of both sexes. There are about forty periodicals of all sorts, and the city ranks among the foremost in South America for culture and education. Bogotá suffers much from its lack of communication, but this is being remedied by governmental improvement of the roads and rivers throughout the country. There is a railroad to Girardot on the upper Magdalena. The city communicates with Honda and La Dorada on the Magdalena by highways, and a projected railway is to connect it with the Orinoco Basin. The industries of the city are not numerous, but include the manufacture of cloth, carpets, matches, glass, cordage, and porcelain. Through Bogotá passes the current of the import trade for the inland States of Colombia amounting to not less than $25,000,000 a year, mostly carried on by natives of the country. The exports of the interior also find their point of distribution here. The district north and east of Bogotá is rich in coal, iron, limestone, sand, manganese, and fire-clay. At Zipaquirá, north of Bogotá, are large salt-mines, worked by the Government, which supply nearly the whole of Colombia with salt and are a great source of revenue.

Bogotá was settled in 1538 by the Spaniards under Gonzalo Jimenez de Quesada, on the site of Tensaquillo, but then called Santa Fé, after the founder's birthplace. In 1598 it became the

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capital of the Viceroyalty of New Granada, and it was the meeting-place in 1811 of the Congress that followed Venezuela in declaring for a republic (November 12). The Spaniards seized it in 1816, but it was recaptured, and on the proclamation of the independence of the viceroyalty (July 20, 1819) it became the capital of the Republic of Colombia, which split up into three States — Venezuela, Ecuador, and New Granada—in 1831, since which time it has been the seat of the Government of New Granada, later Colombia. Population, about 100,000.

BOG-SPAVIN. See SPAVIN.

BOG-TROTTER. An appellation sometimes contemptuously given to the lower class of the Irish peasantry. It owes its point to the ability acquired by many of them of traversing the extensive bogs of their native country, where a stranger would find no secure footing, and in the frequent use which they have made of this means of escape from soldiers, officers of police, or other pursuers.

BOGUE, bōg, DAVID (1750-1825). A Scottish preacher, and the organizer of the London Missionary Society. He was educated at Edinburgh University, and in 1771 went to London, where he was for some time employed as a teacher. He afterwards accepted the charge of an Independent church at Gosport, where he established a seminary for the education of students who purposed to become Independent ministers, and in 1795 he and others organized the London Missionary Society. He also took an active part in the establishment of the British and Foreign Bible Society and of the Religious Tract Society. He was the author of *An Essay on the Divine Authority of the New Testament* (1801), which has had a wide circulation; *Discourses on the Millennium* (1813-1816); and, in connection with Dr. James Bennet, a *History of Dissenters*, from 1688 to 1808 (1812). Consult Morison, *Fathers and Founders of the London Missionary Society* (London, 1846).

BOGUE FORTS. Forts of granite masonry, erected by the Chinese on the rocky islands in the channel of the Boca Tigris (q.v.), to defend the approach to the city of Canton. One remarkable island mass of rounded granite with precipitous sides, rising to a height of about 400 feet, seemed to the Chinese as a tiger's head, though Europeans imagine that of an elephant. The waters of the channel formed the tiger's mouth, or, as the Portuguese translated it, 'boca tigris.' These forts were attacked and captured by the British in 1841 and again in 1856, and are now demolished.

BOGUSLAWSKI, bō'gōō-släv'ské, ADALBERT (1759-1829). A Polish actor and playwright, born in Glinno. In 1790 he was appointed director of the Royal Theatre in Warsaw, where he established a school of dramatic instruction. He is to be regarded as the real founder of a Polish national drama, to whose repertory he contributed a large number of translations and original works. He also introduced opera into Poland. A complete edition of his dramas, in nine volumes, appeared in Warsaw in 1820-25.

BOGUUSLAV, bō'gōō-släf'. A town of the Government of Kiev, Russia, situated on the river Rossa, about 100 miles from the city of Kiev. It has a trade in woolens, leather, and sheepskins, and a population of 9000, 67 per cent. of which is Jewish. The town was annexed to Russia in 1793.

BOHADDIN, bō'hä-dēn', or **BEHA-EDDIN** (ABUL-MOHASSEN YUSUF-IBN-SHEDDAD) (1145-1234). An Arabian historian and statesman. He was born in Mosul, and after concluding his studies there settled first as a tutor in Bagdad, but in 1173 he returned to his native place. In 1187 he went on a pilgrimage to Mecca and Medina, and later to Jerusalem and Damascus. By a work on the *Laws and Discipline of Sacred War*, he attracted the attention of Saladin, and until the death of that prince he was in his employ as cadi of Jerusalem and of the army. After the death of Saladin he remained in the service of Saladin's successor as cadi of Aleppo, where with his own means he established a school. His most important work was a *Life of Saladin*, which was published, with a Latin translation by Schulteus (Leyden, 1732). He died in 1234.

BOHE'MIA (Med. Lat., from Lat. *Boiohæmum*, from *Boii*, a Celtic tribe + OHG. *heim*, Old Sax. *hēm*, home; called by its Slavic inhabitants, the Czechs, Cechy). A former kingdom of Europe, and now a crownland of the Cisleithan (Austrian) half of the Austro-Hungarian monarchy (Map: Austria, D 2). It occupies the northwestern end of Austria, and is bounded by Saxony on the northwest, Prussian Silesia on the northeast, Moravia and Lower Austria on the southeast, Upper Austria on the south, and Bavaria on the southwest. Extending from latitude 48° 34′ to 51° 3′ N., and from longitude 12° 7′ to 16° 50′ E., it comprises an area of 20,060 square miles.

Bohemia is separated from Germany by mountain barriers, which cover all the three sides on which it touches that empire. The Bohemian Forest forms the boundary line on the southwest, the Erzgebirge, or Ore Mountains, on the northwest, and the Riesengebirge, or Giant Mountains, on the northeast. These mountain ranges, together with the Bohemian-Moravian highlands, in the southeast, form a great basin, in the shape of a lozenge. In the interior there are some minor elevations. The rivers of Bohemia, with a few exceptions, flow from south to north. The Elbe, which rises on the northeastern frontier, with its numerous tributaries, drains the larger part of the area. After Elbe, the chief rivers of Bohemia are the Moldau and the Eger, both tributaries of the Elbe. In the northwestern part of the country are famous mineral springs, including those of Karlsbad, Marienbad, Franzensbad, and Teplitz.

The climate of Bohemia is Continental in its character. The average annual temperature of Prague, in the centre of the region, is 48.6°. The maximum reached at Prague, for a period of 30 years, is 97.5° F., and the minimum is 16.24° F. The climate is healthy throughout, mild in the valleys and cold in the mountains, the higher peaks being covered with snow during a considerable part of the year.

Bohemia is still an agricultural country, although some of its manufactures have attained a very high degree of development. The soil is generally fertile, especially in the districts along the upper Elbe, in the vicinity of Königgrätz, in the valley of the Eger, in the lands called the 'Paradise,' near Teplitz, and in a tract in the midland mountains. The chief agricultural prod-

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ucts are cereals, to which about 64 per cent. of the arable land is devoted. Potatoes, sugar-beets, hops, flax, and fruits are grown. The grain of Bohemia is of excellent quality, while its hops are famous throughout Europe.

It is estimated that of the total area of about 12,840,000 acres, 99 per cent. is productive. Of this, about 50.50 per cent. is arable land, 29 per cent. forest land, covered mainly with coniferæ, 10 per cent. meadows, and 5 per cent. pasture-land. A great part of the land is divided into small holdings. In 60 per cent. of it there are about 600,000 holdings, half of which embrace less than 1.5 acres each. The remainder, about 5,000,000 acres, is divided into about 1800 holdings. Cattle-raising forms a very important adjunct to agriculture. Horned cattle, sheep, goats, and swine are reared extensively in some districts, and in the south geese form an important item in the resources of the country. Silk-culture and bee-keeping receive considerable attention.

The forests of Bohemia, in which various kinds of game are found, are very extensive, and the lumber industry gives occupation to a considerable part of the population. Next to agriculture, mining occupies the first rank. In regard to its mineral deposits, Bohemia stands first among the crownlands of Austria-Hungary, the annual value of its mineral products exceeding $20,000,000. About nine-tenths of this sum represents the value of the lignite and coal mined. The bulk of the remainder represents the product of silver, iron, and lead. Among other metals obtained in considerable quantities are gold and tin. Copper, nickel, cobalt, antimony, arsenic, uranium, and tungsten are also found. Other mineral products are alum, kaolin, and garnets. Bohemia is famous for its manufactures of glass, and its textile industries are on a vast scale. The manufacturing of beet-sugar is also very important, as well as the distilling of spirits. There are large iron and steel works, and the manufacture of chemicals is extensively carried on. Among other important industries are the manufacture of agricultural implements, paper-making, and milling. The beer of Pilsen and the china of Karlsbad are celebrated. The tobacco-factories employ about 10,000 hands, mainly women. In general, Bohemia is not only the most important manufacturing province of Austria-Hungary, but also one of the most advanced among the manufacturing countries of Europe. Most of the manufacturing is carried on on a large scale, and the tendency toward concentration is very pronounced. There are still, however, a number of industries carried on almost exclusively in the houses of the workmen, such as lace-knitting, the manufacture of musical instruments, toys, etc.

The commerce of Bohemia is naturally very extensive, and is greatly facilitated by the numerous financial institutions, as well as by the excellent transportation facilities. In 1898 Bohemia had a total railway mileage of about 340, or about 17 miles of railroad per 100 square miles of territory, which is as much as the States of New York and Indiana have. The chief navigable river is the Elbe, and there is also a considerable mileage of artificial waterways.

The Diet of Bohemia consists of 242 members, including the Archbishop of Prague, the heads of the three sees of Leitmeritz, Königgrätz, and Budweis, two rectors of universities, 70 representatives of the large landholders, 87 representatives of towns and chambers of commerce and industries, and 79 representatives of the rural communities. The representatives of the landed aristocracy, as well as those of the towns and industrial centres, are elected directly on a property qualification, while the delegates from the rural communities are elected by a board of electors returned by voters paying a certain amount of taxes. Bohemia is represented in the Lower House of the monarchy by 110 members, of whom 23 represent the landed nobility, 32 the towns, 7 the chambers of commerce, 30 the rural communities, while 18 are elected by all qualified voters.

Public education in Bohemia is well advanced, the line of demarcation between the two elements of the population, Czech and German, being very sharply drawn. There are a German and a Czech university at Prague, the former of which was founded in 1348, several technological institutes, over 40 gymnasia, besides a considerable number of real gymnasia (i.e. gymnasia with a scientific instead of a classical course), preparatory schools, and trade and commercial schools. There are nearly 5500 elementary schools, of which 2315 are German. The schools are attended by about 1,040,000 pupils, or 98 per cent. of the school population.

The population of Bohemia in 1900 was 6,318,697, or nearly 315 per square mile, making Bohemia one of the best-populated crownlands of Austria-Hungary. The increase for the last decade was 8.10 per cent., against 5.16 per cent. for the period of 1880-90. In regard to nationality, the population is 63 per cent. Czech (see division on *History*) and 37 German. The Catholic religion is professed by 96 per cent. of the population, while somewhat more than 2 per cent. belong to the different Protestant denominations and 1.6 per cent. profess the Jewish religion. The capital, Prague, had a population of 204,478 in 1900.

History. In the First Century B.C., the Celtic people, called Boii, who had settled in Bohemia and who gave it its name, were compelled by the advance of the Germans to emigrate from the country. Bohemia was then occupied by the warlike tribe of the Marcomanni. At the time of the great migration of nations the Marcomanni moved westward, and in the Sixth Century we find the region peopled by Slavic immigrants, who soon appear under the common name of Czechs. By the close of the Ninth Century the petty chiefs who ruled the Czechs had been converted to Christianity, which in the main was introduced by the Germans, while the conversion of the adjoining Moravians was undertaken by the great missionaries of the Eastern Church. For a brief period Bohemia formed part of the great Moravian realm of Svatopluk, which fell before the onslaught of the Magyars at the beginning of the Tenth Century. From about this time Bohemia was united under the sway of a line of dukes of the House of Přemysl, who acknowledged the overlordship of the kings of Germany. In the latter part of the Tenth Century the bishopric of Prague was constituted. The princes of the House of Přemysl sought to elevate themselves to the rank of kings, and from the close of the Twelfth Century they were

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permanently recognized as such by the German sovereigns, their State forming part of the Holy Roman Empire of the Germans. Under Ottokar II. (1253-78) Bohemia was for a brief period one of the most powerful realms in Europe. His sway extended from the region of the Elbe to the shores of the Adriatic. Ottokar succumbed to the arms of the Emperor Rudolph of Hapsburg, and his realm was dismembered. His son, Wenceslas II. (1278-1305), who succeeded him in Bohemia and Moravia, was also King of Poland. Ottokar II. and Wenceslas II. did much for the civilization and economic development of Bohemia by encouraging the immigration of German artisans and colonists. With the death of Wenceslas III., in 1306, the dynasty of Přemysl became extinct. From 1310 to 1437 Bohemia was ruled by a line of kings of the House of Luxemburg—John (1310-46), Charles (1346-78), Wenceslas (1378-1419), Sigismund (1419-37). The last three were emperors of Germany. Charles of Luxemburg, who was German Emperor as Charles IV., exerted himself in every way to promote the welfare and greatness of Bohemia. In 1348 he founded the University of Prague, the first established within the bounds of the old German Empire. The good work of Charles was to a great extent undone by the incompetence of his son, Wenceslas. His reign witnessed the great religious movement inaugurated by John Huss and Jerome of Prague. This was one of the most significant anticipations of the Reformation of the Sixteenth Century. The Hussite Wars (q.v.) broke out in the year in which Wenceslas died and lasted at most to the end of the reign of his successor, Sigismund, who, in addition to being German Emperor, was King of Hungary. The Bohemians heroically repulsed the crusading forces of the Catholic Church, and then engaged in a bloody internecine religious strife.

The Hussite movement quickened the spirit of nationality among the Czechs, and arrested the process of Germanization which had made such progress under Charles of Luxemburg. Endless internal dissensions and the extraordinary complexity of the political fabric, with its maze of jurisdiction, stood, however, in the way of the erection of a permanent Slavic monarchy. From 1458 to 1471 the throne of Bohemia was occupied by the shrewd and able George Podiebrad. His successor, Ladislas II., of the Polish House of Jazellon (1471-1516), was chosen to succeed Matthias Corvinus on the throne of Hungary. Louis, the son and successor of Ladislas II., was likewise King of Hungary. He lost his life in 1526 on the field of Mohács, where Sultan Solyman the Magnificent overwhelmed the Hungarians. The Estates of Bohemia now bestowed the crown upon Louis's brother-in-law, Ferdinand of Hapsburg, the brother of the Emperor Charles V. Ferdinand ruled over the old hereditary dominions of the House of Austria, and simultaneously with his election in Bohemia was chosen King by a portion of the Hungarians. Thus were laid the foundations of the Slav-German-Magyar State of Austria-Hungary. The Bohemian realm, or the lands belonging to the crown of Saint Wenceslas, at this time included Bohemia, Moravia, Silesia, and Lusatia. The crown of Bohemia soon became virtually hereditary in the House of Hapsburg. The Hussite movement had paved the way for the introduction of the Reformation into Bohemia. The Hapsburgs directed their energies toward the suppression of Protestantism, and in the struggle that ensued Bohemia lost alike her political freedom and her religious liberties. Ferdinand I. was unable to stem the progress of the Reformation, which continued to spread rapidly under his successors. Bohemia had arrived at a high state of culture at this time. The University of Prague was one of the greatest seats of learning in Europe. The national literature of the Czechs witnessed its Golden Age in the First Century after the Reformation. In 1618 the Protestants of Bohemia rose against the Hapsburgs and precipitated the struggle of the Thirty Years' War. In 1619 the Bohemian estates placed the crown upon the head of the Elector Palatine, Frederick V. (son-in-law of James I. of England), who had to take up the struggle against the Catholic League of Germany, in arms for the newly elected Emperor of Germany, the bigoted Ferdinand II. of Austria. The Catholic forces triumphed at Prague (battle of the White Mountains) in November, 1620. Bohemia lay prostrate at the feet of Ferdinand, who wreaked his vengeance in a merciless way, crushed out Protestantism, and turned the country over to the Jesuits.

Bohemia was a bloody battle-ground in the Thirty Years' War, which ended where it had begun, at Prague. It is estimated that the population of about 2,000,000 was reduced to 700,000, and the civilization of the country suffered a blow from which it never recovered. The people bore meekly the rule of the Hapsburgs, no considerable portion of the population being any longer estranged from them by differences of religion. In the latter part of the Eighteenth Century, however, there was a vigorous reawakening of the national feeling among the Czechs, which, under the stimulus of patriotic writers, gradually developed into an active yearning for national independence. An emphatic utterance was given to this sentiment in 1848, when a Pan-Slavic Congress was convened in Prague. At this time the capital was the scene of an insurrection, which was suppressed by the guns of Windischgrätz. Since then the efforts of the Czechs to regain their autonomy have played an important part in the history of the Empire. The reorganization of Austria-Hungary on the present dualistic basis only intensified the antagonism between the Germans and the Slavs of Bohemia. The Czechs refused to enter the Vienna Reichsrat of 1867; their leaders, Palacky and Rieger, ostentatiously attended the Pan-Slavic Congress at Moscow in 1868, and the demands for national autonomy grew more emphatic with each concession, made by the Taaffe and Badeni ministries, as to the establishment of a Czech university at Prague and the status of the Czech language in the courts and the administration. United as the Czechs are as against the Germans on national issues, they are sharply divided within themselves on other points, the Old Czechs representing the feudal and clerical party, and the Young Czechs the radical and irreconcilable element. It is the latter that has within recent years placed itself into such violent antagonism to German pretensions in the Vienna Reichsrat. The apparent impossibility of reconciling the Czechs to the existing order of things in Austria-Hungary constitutes the chief danger that threatens the stability of the Empire.

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Consult: Bourlier, *Les Tchècques et la Bohème contemporaine* (Paris, 1897); Count Lützow, *Bohemia: An Historical Sketch* (London, 1896); Maurice, *Bohemia from the Earliest Times to 1620*, a popular account in the Stories of the Nations Series (New York, 1896); Gindely, *History of the Thirty Years' War*, 2 vols., English translation by Ten Brook (New York, 1884), for the Bohemian insurrection and its results.

BOHE'MIAN BRETHREN. See BRETHREN, BOHEMIAN.

BOHEMIAN FOREST, or BÖHMERWALD. A mountainous region of Central Europe, separating the Austrian crownland of Bohemia from Bavaria, and extending from the Fichtelgebirge on the northwest to the Danube, below Passau, on the southeast. It forms part of the watershed between the basins of the Elbe and the Danube (Map: Germany, E 4). The region is about 125 miles long and from 20 to 40 miles wide, and covers an area of about 4400 square miles, of which a considerable portion belongs to Bavaria and forms what is known as the Bavarian Forest, or *Bayrischer Wald*. The region is thickly covered with forests, which grow to an altitude of 4000 feet, and abounds in picturesque scenery. The highest summits, which are found in the Bavarian section, in the group of the Arber (Great Arber, Rachel), exceed 4700 feet. The rock formation is chiefly granite, schist, and gneiss. The rainfall is very heavy, and there is an abundance of pasture. The chief products are grain. The inhabitants of the region are chiefly Germans and Czechs.

BOHEMIAN GIRL, THE. The title of a popular opera by Balfe (1843), the book being by Bunn. "Then You'll Remember Me" is a very familiar song from it.

BOHEMIAN LANGUAGE AND LITERATURE. See CZECH LANGUAGE.

BO'HEMUND I. (Lat. *Bohemundus*) (c.1055-1111). The eldest son of Robert Guiscard, the Norman Duke of Apulia and Calabria, born some time between 1052 and 1060. He distinguished himself in the war carried on by his father against Alexius Comnenus (1081-84). Robert Guiscard died in 1085, leaving his property to his younger son, Roger, but Bohemund fought with the latter until 1089, when a peace was made by which Bohemund received a part of Apulia. When the First Crusade was preached Bohemund saw in it an opportunity for extending his possessions. He was the ablest of all the Crusaders, and as long as he remained with them was really their leader, although not officially recognized as such. In June, 1098, when Antioch was captured, he received it as a principality and remained there, taking no further part in the expedition against Jerusalem. In August, 1100, he was captured by the Mussulmans, and held a prisoner until May, 1103. During his absence his cousin, Tancred, ruled over Antioch. In 1104, after suffering a great defeat, he returned to the west to seek aid, and while in France married Constance, the daughter of Philip I. In 1107 he found himself at the head of a large army of adventurers, who had been attracted by his renown. Seized with the restless Norman desire of adventure, he led his forces against the Greek Empire, with which he had been at enmity since 1098. He failed, and after a year's fighting a peace was made by which Bohemund became the vassal of the Emperor for his principality of Antioch. He never returned to Syria, going instead to Apulia, where he died in 1111. Consult Hagenmeyer's *Gesta Francorum* (Heidelberg, 1890), which, in the notes, gives full reference to all facts.—BOHEMUND II., son of Bohemund I., was a minor at the death of his father, and became Prince of Antioch only in 1126. In 1127 he married Alice, daughter of Baldwin II. of Jerusalem. He was killed in battle in 1130. The later rulers of this name are of little importance. Their dates are: BOHEMUND III. (1162-1201); BOHEMUND IV. (1201-33); BOHEMUND V. (1233-51); BOHEMUND VI. (1251-68), the last Prince of Antioch. Consult Röhricht, *Geschichte des Königreichs Jerusalem* (Innsbruck, 1898).

BOHLEN, bō'lĕn, PETER VON (1796-1840). A German Oriental scholar. He was born at Wüppels in Oldenburg, studied at Halle and Bonn, and after 1826 was professor of Oriental languages at Königsberg. Among his publications are: *Das alte Indien* (1830-31); *Die Genesis historisch-kritisch erläutert* (1835); and editions of the *Sententiæ* of Bhartrihari and the *Ritusanhara* of Kalidasa. Consult his *Autobiographie*, edited by Voigt (Königsberg, 1841).

BÖHLER, bē'lĕr, PETER (1712-75). A Moravian bishop and theologian. He was born in Frankfort-on-the-Main, December 31, 1712; was educated at Jena; went to Amsterdam in 1738; and founded Nazareth, in Pennsylvania (1740), and exerted a formative influence upon the religious opinions of John and Charles Wesley, whom he met in the early meetings of the Moravian Church in London (1738). He died in London, April 27, 1775.

BÖHM, bēm, THEOBALD (1794-1881). A Bavarian flute-player and manufacturer of wind-instruments. He is chiefly remembered for his improvements in the construction of the flute. He wrote *Ueber den Flötenbau und die neuesten Verbesserungen desselben* (1847), and *Die Flöte und das Flötenspiel*, and also had some reputation as a composer.

BÖHME, bē'me, or **BÖHM**, bēm, JAKOB (1575-1624). A German theosophist and mystic. He was born of poor parents at Altseidenberg, near Görlitz, in Upper Lusatia, and spent his boyhood in tending cattle. He received no instruction till he was ten years of age; but even then the contemplation of earth and sky had so excited his naturally pious imagination that he conceived himself inspired. He learned the trade of a shoemaker, but continued to devote much of his time to meditation on divine things. About 1612 he composed his first book, called *Aurora, oder die Morgenröte im Aufgang*. The manuscript fell into the hands of the authorities, got him into trouble, and was condemned as heretical. It was not published till 1634. Böhme's fundamental doctrine is that everything exists and is intelligible only through its opposite. Thus, in the very nature of goodness evil is necessary as an element in its perfection. Without evil the will would rest content with its present state, and progress would be impossible. God himself contains conflicting

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elements in His nature, the whole sensible universe being a constituent in His divine holiness. Böhme stated his doctrine in technical theosophic language which makes it quite unintelligible to the uninitiated. Numerous attacks from theologians disturbed Böhme's last years, but he bore them all with great meekness. They were probably occasioned by a tract on repentance, *Der Weg zu Christo*, which his friends had printed without his knowledge. In addition to the two works already mentioned, perhaps his *Mysterium Magnum* should be noted as a characteristic production. The first collection of his writings was published by Beets (Amsterdam, 1660); the most complete in 1730, at the same place; and the latest (1831-47), by Schiebler, at Leipzig. Next to Germany, Holland and England are the countries in which Böhme's works have been received with most favor. In England, where Böhme was generally called Behmen, a translation was published by William Law in 1764. In 1697 Jane Lead, a fanatical disciple of Böhme, founded a sect called the Philadelphians, for the exposition of his writings. In more recent times, and in connection with speculative philosophy in Germany, his views, which had come to be regarded as empty mysticism, have acquired fresh interest and importance. This arises from the kindred character of his fundamental principle with the spirit pervading the systems of Spinoza, Schelling, and Hegel. The intellectual contemplation of the absolute, out of which the contradictions in the world of phenomena proceed, and into which they return, is common to these systems and to Böhme; Hegel, indeed, expressly represents Böhme's negativity, the active principle of development, as an obscure foreshadowing of his own intuitions, and on that account places him at the head of modern philosophy. Consult: Hamberger, *Die Lehre des deutschen Philosophen Jacob Böhme* (Munich, 1844); Fechner, *Jacob Böhme, sein Leben und seine Schriften* (Görlitz, 1857); Peip, *Jacob Böhme, der deutsche Philosoph* (Leipzig, 1860); and Hartmann, *Life and Doctrines of Böhme* (London, 1893).

BÖHMER, bĕ'mĕr, JOHANN FRIEDRICH (1795-1863). A German historian. He was born in Frankfort-on-the-Main, studied in Heidelberg and Göttingen, and from 1830 to 1862 was librarian of Frankfort. In various libraries and archives of the Continent he made valuable researches for the sources of German history during the Middle Ages. His books include *Urkundenbuch der Reichstadt Frankfort*, Vol. I. (1836); *Die Regesten des Kaiserreichs*, etc. (1844, 1849, 1857); and *Fontes Rerum Germanicarum*, Vols. I.-IV. (1843-68).

BÖHMERT, bĕ'mĕrt, KARL VICTOR (1829—). A German writer on political economy. He was born in Quesitz, Saxony, and studied in Leipzig. In 1857-60 he edited the *Bremer Handelsblatt*, from 1866 to 1875 he was professor of political economy at the University of Zürich, and from 1875 to 1895 director of the bureau of statistics of Saxony. He was appointed in 1875 professor of political economy and statistics at the technological institute in Dresden. He has sought steadfastly to promote free trade, and to liberate German industry from its mediæval restrictions. He has in many ways sought to improve the condition of the working classes, and has written *Briefe zweier Handwerker* (1854); *Freiheit der Arbeit* (1858); *Der Sozialismus und die Arbeiterfrage* (1872); and other important studies.

BÖHMERWALD, bĕ'mĕr-vält. See BOHEMIAN FOREST.

BÖHMISCH-LEIPA, bĕ'mĭsh lī'pä. See LEIPA.

BOHN, bōn, HENRY GEORGE (1796-1884). An English author, translator, and publisher, of German parentage, born in London. He rendered a valuable service to the English-speaking world by republishing, at a cheap rate, a vast number of the most valuable works in literature, science, philosophy, and theology. He obtained distinction as the editor of the *Bibliotheca Parriana*, of Lowndes's *Bibliographer's Manual* (1857-58), and as a translator of Schiller, Goethe, and Humboldt. He also compiled a *Polyglot of Foreign Proverbs* (new ed., 1884); a *Pictorial Handbook of Modern Geography* (1847); and a *Handbook of Pottery and Porcelain* (1849). He acquired great wealth and made valuable collections of china, paintings, ivories, etc.

BOHNENBERGER, bō'nen-bĕrk'ĕr, JOHANN GOTTLIEB FRIEDRICH VON (1765-1831). A German astronomer and mathematician, born at Simmozheim, Württemberg. He studied at the University of Tübingen, in 1796 became connected with the observatory of the University, and in 1798 was appointed professor of mathematics. He was an assistant editor of several scientific periodicals, and published *Anleitung zur geographischen Ortsbestimmung* (1795), an *Astronomie* (1811), and *Anfangsgründe der höhern Analysis* (1812).

BOHNSTEDT, bōn'stĕt, LUDWIG (1822-85). A Russo-German architect of note, born in Saint Petersburg. He studied in Berlin at the University, the School of Architecture, and the Art Academy, and in 1858 was appointed a professor in the Art Academy in Saint Petersburg. In Russia he made the plans for the reconstruction of the Chinese palace at Oranienbaum, and for numerous prominent buildings in Saint Petersburg, Moscow, and Riga. In 1863 he left Russia, and removed to Gotha, where he died. His most important work is generally considered to be the Cathedral of San Torquato at Guimarães, Portugal.

BOHOL, bō-hōl'. One of the Bisayas group of the Philippine Islands, in latitude 9° 50′ N., and longitude 124° 15′ E., situated between the islands of Cebú, Leyte, and Mindanao (Map: Philippine Islands, J 10). It is about 47 miles long and 34 miles wide. Its surface, covering 1440 square miles, is generally mountainous and the north and west coasts are bordered by reefs. The island is not very fertile, but produces cacao, tobacco, cotton, hemp, rice, sugar, and corn, and is also well wooded. Tagbilaran is the provincial capital. Under the Spanish régime Bohol formed, together with the neighboring island of Dauis, the province of Bohol, with a population of 247,745 inhabitants.

BO'HOR. An antelope (*Cervicapra bohor*), one of the larger reitboks. It ranges in East Africa from Abyssinia to Rhodesia. See REITBOK.

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BÖHTLINGK, bēt'lĭŋk, OTTO VON (1815—). A Russian-German Orientalist and Sanskrit scholar. He was born in Saint Petersburg, studied there and in Berlin and Bonn, and in 1842 returned to Saint Petersburg. He became a member of the Academy of Science in 1855 and a privy councilor in 1875. In 1868 he left Russia and moved to Jena. In 1885 he moved again to Leipzig. In collaboration with Prof. Rudolph Roth of Tübingen, he published his most important work, the great *Sanskrit Wörterbuch* (Saint Petersburg, 1853-75). An abridgment and supplement of this appeared in 1879-89. His edition of the great Sanskrit grammarian Panini (2d ed., Leipzig, 1878), and of a series of Sanskrit apothegms and proverbial verses, *Indische Sprüche* (2d ed., 3 vols., Saint Petersburg, 1870-73), are standard works; and among his many other publications may be mentioned a *Sanskrit-Chrestomathie* (Saint Petersburg, 1845; 2d ed., ib. 1877-97), and an edition with translation of a treatise on Hindu poetics by Dandin, *Kāvyādarśa* (Leipzig, 1890).

BO'HUN. The name of several English nobles. HUMPHREY, fifth of the name (? -1247), went on the Crusades in 1250, in 1257 was in charge of a portion of the Welsh marches, supported the King against Simon de Montfort, and was taken prisoner at Lewes (May 14, 1264). —HUMPHREY, seventh of the name (? -1298), was prominent with Roger Bigod in opposition to the measures of arbitrary taxation resorted to by Edward I. During Edward's absence in Flanders he and Bigod obtained from the regent a confirmation of the charters, with supplementary articles whereby the King was to surrender the right to taxation without national consent. This confirmation was subsequently ratified by the King.—HUMPHREY, eighth of the name (1276-1322), joined the barons in their armed protest against Piers Gaveston, the favorite of Edward II. In 1321 he appeared with troops in London in revolt against the Despensers, who were forthwith banished. In October of that year, however, Edward took the field in attack upon Bohun and other rebellious lords, and Bohun was killed at Boroughbridge (Yorkshire) March 16, 1322.

BOIARDO, bō-yär'dō, MATTEO MARIA, Count of Scandiano (c.1434-94). A celebrated Italian poet, born at Scandiano. Educated at the University of Ferrara, he long resided at the Court of Borso and Ercole d'Este, Dukes of Ferrara, who were his steadfast friends and patrons. He was made Governor of Reggio in 1478, Captain of Modena in 1481, and was in 1487 reappointed Governor of Reggio, continuing in this office until his death. Encouraged in his literary ambitions by his masters, he produced his *Orlando Innamorato* (1486), a wildly romantic epic, only three books of which were attempted, the third being left incomplete. The poem, published in 1495, was written in ottava rima (which Byron employed so skillfully in *Don Juan*), and is concerned with the Charlemagne cycle, representing Roland in love with the Princess Angelica of the East. Gorgeous in coloring, and filled with chivalrous incident, it was thrice reprinted before 1520, passed through sixteen editions before 1545, and, early translated into French, has gone into almost every European language. Three additional books were written by Niccolò degli Agostini (1506-31), which, though very mediocre, have remained a part of the poem. In 1541 Francesco Berni brought out his *rifacimento*, and in 1545 another version was completed by Lodovico Domenichi, both of which proved more popular than the original, though not so meritorious. The poem is the more famous as having suggested Ariosto's *Orlando Furioso*. Almost forgotten, the original form was issued by Panizzi in 1830-31. Other works by Boiardo are: *Sonnetti e canzoni* (1499); *Il Timone* (1500); *Carmen Bucolicon* (1500); *Capitoli in terza rima* (1523); *Apulejo dell' asino d'oro* (1516); *Asino d'oro de Luciano tradotto in volgare* (1523); *Erodoto Alicarnasseo istorico, tradotto di greco in lingua italiana* (1533). Consult Panizzi, *Boiardo, Orlando Innamorato; Ariosto, Orlando Furioso, with an essay on the Romantic Narrative Poetry of the Italians, Memoirs, and Notes* (9 vols., London, 1830).

BOIELDIEU, bwäl'dyē', FRANÇOIS-ADRIEN (1775-1834). An eminent composer of French *opéra comique*. He was born December 15, 1775, Rouen, son of an archbishop's secretary. He ran away from his teacher, the organist Broche, to Paris (1787), whence he was ignominiously brought back; and Broche's lessons seem to have been all the formal instruction that Boieldieu received. The local success of his operas *La fille coupable* (1793) and *Rosalie et Myrza* (1795) induced him to go again to Paris, where he had to earn a living by tuning pianos for the Erards. Here he made the acquaintance of Méhul, Cherubini, and the tenor Cârat, who made Boieldieu famous by singing his songs in public. *Les deux lettres* (1796) and *La famille suisse* (1797) had an enormous success at the Opéra Comique. He published various instrumental pieces and then triumphed again with *Calife de Bagdad* (1800). Some caustic remarks of Cherubini about "undeserved success" made Boieldieu apply himself to serious study of counterpoint, the results of which were noticeable in *Ma tante Aurore* (1802). About this time his home life became so unbearable that he removed to Saint Petersburg (1803) to become *maître de chapelle* to the Court. In the eight years of his sojourn there he produced no work of merit, though bound by contract to write three operas annually in addition to other specified duties. Lung trouble hastened his return to Paris, where *Jean de Paris* (1812) was hailed with delight. He succeeded Méhul (q.v.) as professor of composition in 1817; *Le chaperon rouge* was given in 1818, and after a seven-year silence, *La dame blanche*, generally conceded to be his masterpiece, created a veritable sensation. The next work, *Les deux nuits* (1829), had only a *succès d'estime*, and Boieldieu did not try his hand again. He retired from the Conservatory on a pension, but this was revoked by the Government in 1830. Boieldieu died near Grosbois, October 8, 1834, of laryngeal phthisis, his sufferings somewhat relieved by the care and love of his second wife. His operas—of which *La dame blanche*, *Jean de Paris*, and *Le Calife de Bagdad* still hold the stage—are the finest examples of *opéra comique* in its earlier stage of development. Genuine comedy, intermingled with romanticism, seductive melody, orchestration that fairly glows with color yet never obscures the voice, grace, delicacy, and unflagging interest—such are the characteristics of Boieldieu's music. The list of works written in collaboration with Cherubini, Méhul, Isouard, Berton,

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Kreutzer, and others runs into dozens. Among his pupils, the most famous were Adam, Fétis, Zimmermann, and Labarre. Consult: A. Pougin, *Boieldieu, Sa Vie et ses Œuvres* (Paris, 1875); and G. T. Ferris, *Great Musical Composers* (New York, 1887).

BOIES, HORACE (1827—). An American politician. He was born in New York, and in 1858 was a member of the New York Assembly, but removed to Iowa in 1867. In 1883 his opposition to the tariff and prohibition policy of the Republican Party, which he had joined in early life, led him to identify himself with the Democrats, by whom, in 1889, and again in 1891, he was elected Governor of Iowa.

BOII, bō'ī-ī. A Celtic people, who early migrated eastward from Gaul into northern Italy, Bohemia, and the region of the Eastern Alps. In Italy they stubbornly resisted the Romans, sometimes victors, often vanquished. They united with both Hannibal and a lesser Hamilcar against the common enemy, but in B.C. 191 they were definitely defeated by Scipio Nasica, and about half their lands seized. About a century and a half later the Germanic peoples pressed into the northern abodes of the Boii, who were unable to resist them. A fragment of the tribe joined the Helvetians in their migration into Gaul, and were met by Cæsar, who settled them in the land of the Ædui. The country of the Boii, to the north of the Danube, after it had been overrun by the Marcomanni, was still called Boiohæmum, the land of the Boii, the modern Bohemia. Another survival of the name is Bavaria.

BOIL (allied to Lat. *bulla*, a bubble), or FURUNCLE (Lat. *furunculus*). An acute circumscribed suppurative inflammation of the skin and subcutaneous tissue. It begins as a small hard point of a dusky-red color, which is hot, painful, and throbbing. This point extends, and during several days these symptoms increase in severity until finally the boil ceases to enlarge. It is then of a conical form, with a broad, firm base, and presents on the apex a whitish blister, which contains a little pus. This opens, and after a few days more there is discharged a core or slough of cellular tissue, and the small cavity left heals rapidly, leaving a white depressed scar. Boils are most common in the spring, and in young and plethoric persons, and their appearance is quite consistent with robust health. Men somewhat overtrained for athletic contests, and others who have suddenly changed their diet and daily habits, are subject to them. In some, boils continue to succeed each other for a length of time. In the treatment of boils, the intestinal canal should be cleared out by laxative medicines, and the digestive power improved by tonics and antacids. The skin should be kept healthy by frequent washing, while the inflamed spots should be poulticed with a solution of flaxseed mixed with an antiseptic, to avoid infection of neighboring parts. A weak antiseptic lotion (bicholoride of mercury, 1 to 5000, or carbolic acid, 1 to 200) is a sufficient application after the core has been thrown off. Deep incision after pus appears is the best and most satisfactory treatment. The cause of boils is infection with a pus-germ, generally the Staphylococcus bacillus, which enters a hair-follicle or a sweat-gland.

ALEPPO BUTTON or *Aleppo Boil.*—An endemic disease of hot countries, consisting of a scab or an ulcer which attacks the face chiefly, and is due to infection of a micro-organism. It is also called *Biskra button, Gafsa button, Kandahar sore, Natal sore, Delhi boil,* and *Oriental boil.* It is found in the countries bordering the southern and eastern shores of the Mediterranean Sea, in Crete, Cyprus, the Crimea, and especially in Persia. It was first described by Russell, who saw it in Aleppo in 1756.

Aleppo button is caused by a diplococcus, which is found in the blood of ulcers, as claimed by Duclaux, who is quoted approvingly by Flexner. Others have found a similar if not the same micrococcus in the nodules. In the course of the disease a red spot appears, which soon becomes a papule (pimple), then a nodule, and then a scab forms. Under the scab is a sharply punched ulcer, which is uncovered later, when its border becomes thicker. The period of incubation after inoculation of the face or any uncovered part is from three days to several months. The disease is not constitutional. Usually there is but one boil, but there may be as many as ninety on the face and body (Crocker). The disease runs a course of six to twelve months, and hence the Persians call it 'the one-year boil.' Distorting cicatrices result. It is most common in children over 2 years of age. The best treatment is to scrape the surface with a sharp spoon and cauterize with nitric or carbolic acid.

BOIL, *Span. pron.* bō-ēl', **BOYLE,** or **BUIL,** BERNARDO. A Spanish Benedictine friar of the monastery of Montserrat, Catalonia, and the first priest to visit the New World. Under Papal appointment (1493) as apostolic vicar of the Indies, he accompanied Columbus on the Admiral's second voyage (1493-94). He was attended by three other friars, and on Epiphany Sunday (January 6), 1494, said the first mass performed in America. He was one of the four commissioners selected to govern the colony of Isabella during the absence of Columbus on a voyage of further discovery (April 24, to September 29, 1494). Already, it would appear, jealous of the Admiral, he now turned traitor, and with Margarit and others similarly disloyal, sailed for Spain, there to spread every sort of misstatement against his commander.

BOILEAU - DESPRÉAUX, bwä'lō'dā'prā'ō', NICHOLAS (1636-1711). The most distinguished of French critics in the age of Louis XIV., known as the 'legislator of Parnassus.' He was in criticism an incarnation of correct commonplace common sense, a schoolmaster in careful workmanship, sworn enemy of all false sentiment and preciosity, such as marred the poetry and fiction of his immediate predecessors. He was born in Paris, November 1, 1636, studied first for the priesthood, then for the law, but found his place instinctively in the rather Bohemian literary company of Molière, La Fontaine, Racine, the philologist and realistic novelist Furetière, and the witty Ninon de l'Enclos. Of the Hôtel Rambouillet and its literary coterie he made one trial and never another. Louis XIV. liked his rare honesty and gave him a pension, but he shunned the Court, save when he could serve a friend there (e.g. Corneille), for he was a bourgeois and not at ease with the aristocracy. Feeble, asthmatic, in later life a little deaf, poetry was his aspiration, and criticism, justly weighed and carefully balanced, his delight. His life was uneventful. He never left Paris and its environs save at the com-

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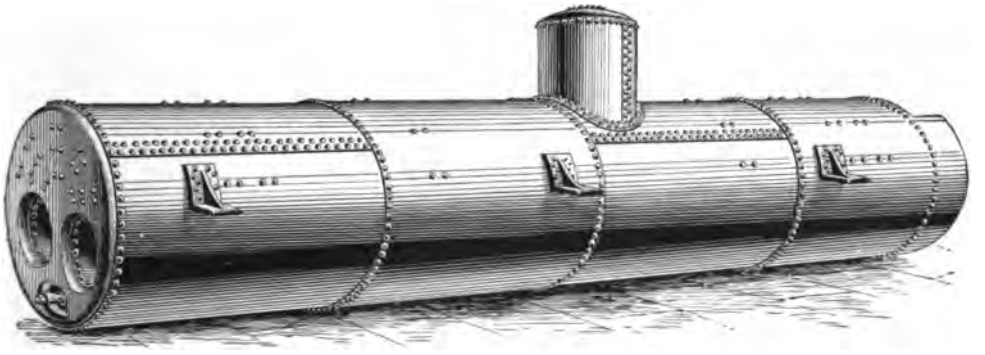
mand of the King, who made him a royal historiographer, and he died at Auteuil, March 13, 1711. His satire on the vices of Paris was his first success, and by its date gave a name to the 'school of 1660.' Seven other satires appeared in 1666, and five more complete the list. They are in rhymed couplets, polished, harmonious, witty, with the maliciousness of merciless personalities. This was destructive criticism with a vengeance. In the *Art poétique* (1674) he was constructive, and, following Horace's *Ars Poetica*, gave a theory of poetic composition in four cantos, of which the first lays down general rules, the second applies these to lyric poetry, the third to the epic and the drama, while the fourth contains general reflections, advice, and cautions, all spiced with brilliant wit and barbed with personal allusion. He preached a reign of literary law, truth in subject, conscientious workmanship in form, unity, clearness, proportion. He sought to establish literature on an unchanging foundation and to give canons of classicism for the ages. And indeed his work has a perennial reasonableness, though it allows scant scope for "the heat and height of sane emotion" and the unchartered play of genius. For Boileau's mind was material, logical, lacking in imagination. He has been studied by generations because his is the art that can be learned, as Pope, his best pupil, learned it, though his own Horace might have taught him that the true poet could not be made. Boileau repeated and enforced his critical views in the prose *Dialogue des héros de roman*, whose authorship he at first concealed, and in *Réflexions critiques sur Longin* (1693). His own best verses are twelve *Epîtres* and a mock-heroic epic, *Le lutrin*, which was his most popular work. It was published in part in 1673, but not in full till after his death. This and all the poems are filled with cleverly turned lines that remain as familiar quotations, but Boileau should be most gratefully remembered as the first systematic critic of France, the first to make criticism an art. He was narrow and sometimes unjust, he never fully grasped the fundamental principles of the classic art he admired; but his honest, loyal, stubborn, rough good sense did much to direct the talent of Molière, Racine, and La Fontaine to its most fruitful channels and to guide the next generation to a true, though partial, naturalism. On the lyric poetry of succeeding generations its effect was to cultivate a formal technique and so to check inspiration that first fully revives in the Romantic School. The best edition of Boileau's *Works* is by Gidel, 4 vols. (1870-73). Consult: Deschanel, *Le romantisme des classiques*, 4th series (Paris, 1888); Lanson, *Boileau* (Paris, 1892); Morillot, *Boileau* (Paris, 1892); Faguet, *XVII. Siècle*, Etudes littéraires (Paris, 1887); Hemon, *Cours de littérature* (Paris, 1889-95).

BOILER. In steam engineering, a vessel in which steam is generated at a high pressure for heating or power purposes. In its simplest form, it consists of a closed vessel made of sheet metal, having apertures for the admission of water and egress of steam, fitted with apparatus for showing the level of the water and the pressure of the steam, and set or mounted in combination with a furnace, either internal or external. When water is boiled in an open pan, the temperature of the water and of the steam rising from it remains at, or very near, 212° F., and the tension or pressure of the steam is no more than sufficient to make its way into the atmosphere, being exactly equal to that exerted in all directions by the atmosphere itself—namely, 14.7 pounds per square inch. In a closed vessel, on the other hand, the temperature and pressure to which we can raise the steam are only limited by the strength of the vessel or boiler against bursting. The form of a boiler is determined by two considerations—namely, strength to withstand internal pressure, and efficiency in producing steam; and the object of the designer is to combine in one apparatus sufficient strength to work safely at the proposed pressure, with such a form and arrangement as shall abstract the maximum of heat from the gases of combustion, and at the same time be in all respects suitable to the special circumstances of the case. The globular form is that best adapted for strength, and was the earliest to be used. It presents to the fire, however, the minimum area in proportion to its contents, and therefore has a minimum efficiency. After spherical boilers, cylindrical ones came into use, at first set on end, and afterwards laid on their sides, and later on these were furnished with internal cylindrical tubes for furnaces. Watt's 'wagon boiler' (so called from its shape) was used for many years, but being quite unfit for any but the lowest pressures, it has long been discarded; and the 'egg-end' boiler, or plain cylinder with hemispherical ends, also much used at one time, has now almost disappeared on account of its small evaporative efficiency, it being used only where large



DOUBLE-FLUE BOILER.

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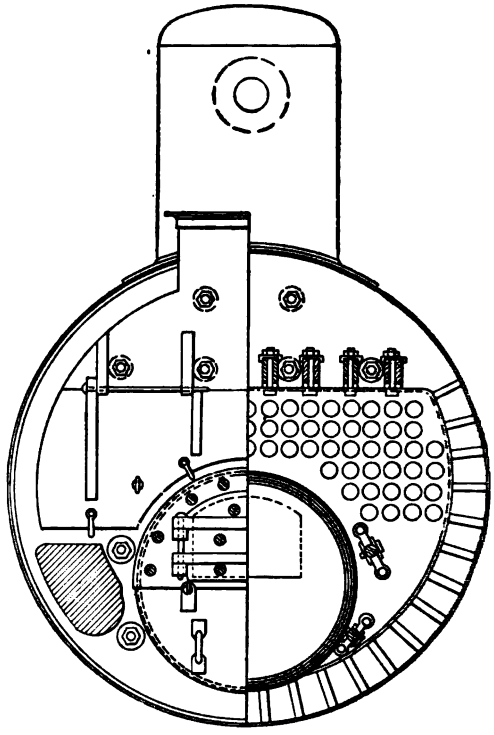
quantities of waste fuel material, such as sawdust, can be had practically without cost.

Modern steam boilers may be classified according to their form and construction, or according to the character of their employment. Under the first division we have horizontal and vertical boilers, internally and externally fired boilers, shell and sectional boilers, fire-tube and water-tube boilers, or boilers combining two or more of these several features. Under the second division are included stationary boilers, locomotive boilers, marine boilers, and various forms of portable or semi-portable boilers. The variety of forms and methods of construction of stationary boilers are very great, but the locomotive boiler is practically limited to a single form, and marine boilers are usually of the drum type known as the Scotch boiler, although water-tube boilers of various forms are coming into use more and more. Recently considerable attention has been devoted to the development of a boiler for automobiles. See AUTOMOBILE.

The most familiar form of boiler is, perhaps, the cylindrical tubular boiler. It consists of a cylindrical shell closed at the ends by circular plates, and has a number of tubes extending lengthwise of the boiler and terminating in the end plates. These tubes are open at both ends and through them pass the gases of combustion. The grate or furnace is placed underneath the front end of the boiler-shell, and from it the gases pass back under the shell to its rear end, thence up and forward through the tubes to the front end, and thence out of the chimney. In this passage the hot gases give up a portion of their heat to the water surrounding the tubes inside of the shell. Technically classified, this boiler is a horizontal, externally fired, fire-tube shell boiler. Another form of horizontal shell boiler frequently used has the numerous fire-tubes replaced by two large cylindrical flues. This type of boiler is less efficient than the tubular boiler, but its greater simplicity, and its accessibility for cleaning give it advantages, especially where the feed-water is bad. The flue boiler has several modifications which are known by special names. The Lancashire boiler has two flues which are crossed at intervals by conical-shaped tubes whose purpose is to provide an internal bracing for the flues and to add to the heating surface. In this boiler the grates are placed inside the flues at the front; or, technically classified, it is an internally fired, horizontal, double-flue, shell boiler. The Galloway boiler has two flues at its front end like the Lancashire boiler, but a short distance back of the grate these flues converge into one large flue which is crossed by water-tubes like those used in the Lancashire boiler. The Cornish boiler has one large instead of two smaller flues. Both the Galloway and Cornish boilers are internally fired.

Vertical boilers consist of a cylindrical shell set on end, with the grate at the bottom and fire-tubes running vertically. In large stationary boilers of this type the boiler is mounted on a masonry foundation, but in small portable boilers, such as are commonly used for hoisting-engines, the boiler is set on a cast-iron base which contains the grate and ash-pit complete. Some of the larger stationary vertical boilers built at present are from 20 feet to 30 feet high. Fire-engine boilers are always of the vertical type. See FIRE-ENGINES.

The Scotch marine boiler is a cylindrical shell boiler, but little, if any, longer than its diameter, resembling a large drum in shape. It is set horizontal. In the lower half of the boiler there are from two to four flues which terminate in a combustion chamber at the rear, and in the upper part there are a large number of fire-tubes terminating in the combustion chamber and in the uptake to the smokestack at the front. Double-ended boilers of this type have furnaces at each end, and resemble two single-ended boilers placed back to back. Sometimes



SCOTCH MARINE BOILER, END VIEW.

a common combustion chamber is used for both sets of furnaces in a double-ended Scotch boiler, but it is considered to be better practice to have a separate combustion chamber for each set of furnaces. In recent years, as has previously been stated, water-tube boilers of various forms have been substituted for Scotch boilers, particularly for naval vessels. The locomotive boiler consists essentially of a rectangular fire-box and a cylindrical barrel through which numerous fire-tubes extend from the fire-box to the smoke-box. The latter forms a continuation of the barrel from which the products of combustion pass up the smokestack.

All the boilers so far described have been of the fire-tube type—that is, the tubes and flues passing through the boiler-shell have been for the conveyance of hot gases from the furnace. The idea of using tubes and flues is to provide a greater heating surface, and thus use the heat from the fuel more thoroughly and generate steam more rapidly. To economize heat and increase the rapidity of raising steam still further, the water-tube boiler has been developed, and is now being extensively used. In water-tube

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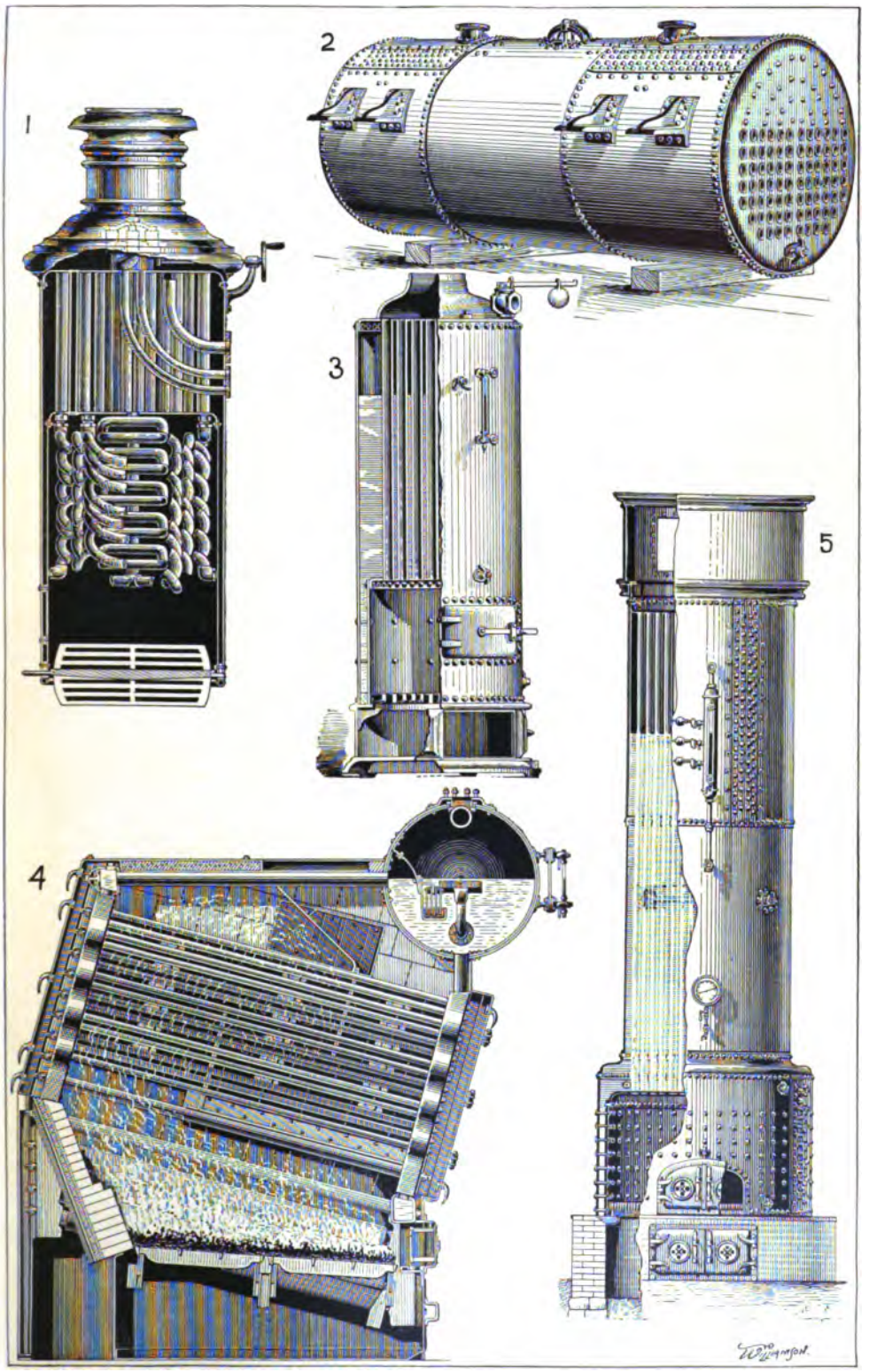
BOILERS



1. BOILER FOR CLAPP AND JONES FIRE ENGINE.
2. HORIZONTAL FIRE-TUBE BOILER.
3. VERTICAL FIRE-TUBE BOILER.
4. BABCOCK AND WILCOX MARINE WATER-TUBE BOILER.
5. MANNING VERTICAL FIRE-TUBE BOILER.

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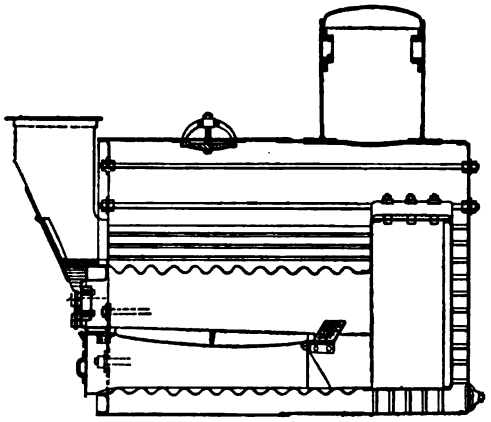
boilers there are two or more shells or drums connected by tubes of small diameter. These drums and tubes are filled with water and the hot gases from the furnace pass around and between the tubes, and so heat the water contained within them. A great variety of water-tube boilers are used, some having only one drum, and others having as many as four drums. The tubes connecting these drums vary from



SCOTCH MARINE BOILER, LONGITUDINAL SECTION.

perfectly straight tubes to tubes bent to various degrees of curvature, approaching in some boilers a complete spiral. Water-tube boilers may be made light, powerful, and compact, and are well adapted for forced draught; steam may be raised rapidly from cold water or a sudden demand for increased pressure quickly met. For these reasons, particularly, they are largely used on war-vessels, especially of the torpedo-boat and torpedo-boat-destroyer classes, though most vessels in the merchant marie continue to employ the Scotch boiler. The water-tube boiler is also extensively employed in large power-generating plants on land.

Boiler-settings are the supports of masonry or metal upon which the boiler rests and by which it is oftentimes wholly or partly inclosed. Large stationary boilers usually have masonry settings, while portable and semi-portable boilers have settings of cast-iron. Locomotive boilers can hardly be said to have settings unless the locomotive frame upon which they are carried may be said to be one. Marine boilers are seated on plates and castings, which are built into the bottom framing of the ship. In externally fired boilers the setting usually contains the furnace. (See FURNACES.) Boiler fittings or accessories comprise steam-pipes and blow-off pipes, safety, check, and gate valves for various purposes (see VALVES); dampers and regulators; feed-pumps and feed-water heaters; steam-traps and steam-separators, and steam-gauges and water-glasses, besides a number of minor contrivances for one purpose or another in the operation of the boiler.

The material chiefly employed in the manufacture of boilers is steel, but wrought-iron, copper, bronze, brass, cast-iron, and malleable iron are sometimes employed. In order to make certain that the material used has the proper strength and toughness, it is usually required that the plates be tested by cutting off small pieces and breaking them in a testing machine (see TESTING MACHINES) previous to use. After passing the tests the plates, which are shipped to the boiler-shop perfectly flat and of various sizes to suit the different sizes of boilers and the different uses to which they are put, are cut or sheared to the proper dimensions, the edges are planed, flanged, punched for riveting, and bent by means of heavy rolls to the proper curve. The next step is to assemble the different parts and rivet them together. Finally, when the boiler is complete, it is tested by filling it with water under pressure, which determines whether it has the proper strength to carry the steam-pressure, and whether there are any leaks. Very often, a boiler is also tested after it has been installed ready for operation to determine its economy and efficiency in generating steam. It is the usual practice to rate and sell boilers by the horse-power, this custom having originated early in the days of the steam-engine. The term horse-power, as applied to a steam boiler, has a purely arbitrary significance only, since the power from the steam is developed in the engine, and since the economy in the use of the steam depends on the engine only and often arises in different types of engines and under different conditions of maintenance and operation. The rule established by the American Society of Mechanical Engineers is to consider 30 pounds of water evaporated per hour from a temperature of 100° F. under a pressure of 70 pounds by the gauge as equivalent to one horse-power. See HORSE-POWER.

Boiler explosions may occur from various causes, but the most frequent cause is the very simple one that the boiler is too weak to endure service of the regular working pressure. A new boiler may be weak through defective design or workmanship, and an old boiler is liable to become weak through rust and general deterioration. The safety of a boiler from explosion is insured only by careful and correct design, honest and thorough workmanship, and intelligent care in service. See ENGINES.

BIBLIOGRAPHY. The literature on boilers is very extensive, and students have the choice of a number of standard books treating of the history, design, and construction of such apparatus. The following works will be found to cover the subject thoroughly: Thurston, *A Manual of the Steam Boiler* (New York, 1896); Barr, *Boilers and Furnaces* (Philadelphia, 1899); Bertin, *Marine Boilers* (London, 1898).

BOILING. See COOKERY.

BOILING-POINT. The temperature at which a liquid substance boils. Evaporation of water takes place, more or less rapidly, at all temperatures (even at temperatures at which it rapidly freezes), no matter how great the pressure of air or other gases on its surface. When some water is placed in a closed vessel, evaporation will go on until the escaping vapor has attained a certain definite pressure of its own, whose magnitude is dependent on nothing but the temperature of the water; this pressure of water-vapor is called the *vapor-tension* of water at the given temperature. Now, though the magnitude of vapor-tension has nothing to do with the presence or absence of air in the vessel, the rate at which evaporation proceeds is greatly influenced by the pressure which air inclosed within the vessel may exert on the sur-

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face of the water; the presence of air checks the speed of evaporation, though it cannot prevent it from going on until the vapor-pressure has finally attained its limit determined by the temperature.

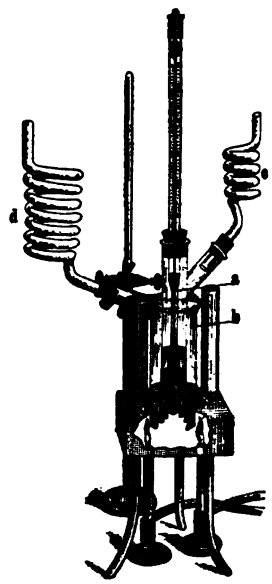
While the presence of air thus diminishes the rate of evaporation, an elevation of temperature causes, on the contrary, a corresponding increase of that rate. As the temperature of the water rises, its vapor-tension continuously increases, and with it increases the rate of evaporation. Finally, when the temperature has risen to the point at which the vapor-tension is equal to the external pressure of the air, evaporation becomes very rapid indeed, and bubbles of water form in brisk succession throughout the volume of the liquid, throwing it into more or less violent commotion; the water is then said to be *boiling*. If the steam is now allowed to escape, boiling will go on until all the water has been evaporated; and if, while the liquid is boiling, the bulb of a mercury thermometer be placed near the surface of the water, the thermometer will register a constant temperature (provided the water is pure). This constant temperature, the lowest at which, under a given pressure, water will continue to boil, is called the boiling-point of water at that pressure.

The so-called normal boiling-point of water is 100° Centigrade (212° F.). This is the temperature at which water boils under normal atmospheric pressure; i.e. when the height of the mercury barometer is exactly 760 millimeters (30 inches). A change of pressure will at once result in a corresponding change of the boiling-temperature. In elevated positions, where the atmosphere is rare and the barometric pressure comparatively low, the boiling-point is lower than at the level of the sea. At the City of Mexico, 7000 feet above the sea, water boils at 93.3° C. (200° F.); at certain points in the Himalayas it boils at 82.2° C. (180° F.). Boiling water is thus not always equally hot, and in elevated places many substances cannot be cooked by boiling. Once the boiling-temperatures of water corresponding to different heights have been ascertained, we can, conversely, determine the height of a mountain by observing the boiling-point of water at its summit.

The above statements as to the boiling-point of water are true only of water which is chemically pure and contains no admixture of any sort. If, instead, we take a solution, say, of ordinary salt, we will find: (1) that when heated under normal atmospheric pressure, the solution will begin to boil at some temperature higher than 100° C.; and (2) that, whatever the temperature at which boiling will begin, if the steam is allowed to escape, the temperature of the boiling solution will continuously rise; in other words, the solution will not continue boiling at a constant temperature. When the 'boiling-point of a solution' is spoken of, it should be understood to mean the degree of heat at which boiling just commences. The only reason that a solution will not boil at constant temperature lies in the fact that, during the process of boiling, its composition changes; for when a solution boils, water escapes in the form of steam, while the solid substance remains behind and its proportionate amount in the solution consequently increases. If, however, the steam is continually condensed by means of a suitable cooler, and thus made to return to the solution, the composition of the latter will remain unchanged, and no matter how long boiling is kept up, the temperature will remain constant; this temperature is evidently the point at which otherwise, if the steam were allowed to escape, boiling would just commence.

From what has been said of boiling solutions, it may be seen that the boiling-point of a liquid is the higher, the greater the amount of foreign substance contained in it.

This is, however, not the only factor on which the temperature of a boiling solution depends. The molecular weight of the dissolved substance is another factor. If we were to take two equal quantities, say, of water, heat them to boiling and then add to them, respectively, equal weights of two different substances, we would find that the elevation of temperature is greater in the case of the sample to which we have added the substance of smaller *molecular weight*. Experiments carried out in this manner with many different substances permit us to induce the law, that *the difference of the boiling-temperatures of a solution and of the pure solvent is inversely proportional to the molecular weight of the substance dissolved*. It must, however, be borne in mind that the law is limited to solutions which do not conduct electricity; in solutions of electrolytes relations are not quite so simple. (See articles SOLUTIONS and DISSOCIATION.) In the case of solutions of non-electrolytes, such as many of the carbon compounds, the law holds with considerable precision; and it has proved especially useful in this, that it permits us to determine the unknown molecular weights of newly discovered substances. To ascertain, by this method, the molecular weight of a new substance, all the chemist has to do is first to observe the rise of temperature produced in a boiling solvent, when a certain quantity of his substance is added to it, and then to compare the rise of boiling-point to the rise produced by the same quantity of some other substance, of known molecular weight. These important determinations are carried out with considerable precision by the use of Beckmann's apparatus (see figure).



BECKMANN'S APPARATUS.

The apparatus consists essentially of two parts: an inner tube, *a*, containing the solution, and an outer vessel, *b*, containing the pure solvent and separated from *a* near the bottom by a sheet of asbestos. The coolers *c* and *d* serve to condense the escaping vapors. To determine the rise of boiling-point caused by a given substance, the operator introduces into *a* first a few cubic centimeters of the pure solvent,

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observes the boiling-point, then introduces also a known amount of his substance, and again observes the boiling-point. In the case of most solvents, the inner tube need not be heated directly, and heating only the outer vessel is sufficient to keep the liquid in the inner tube boiling.

What has been said above of pure boiling water applies equally well to any other compound in the liquid state; any liquid consisting of one single chemical compound has a definite boiling-point depending on nothing but the external pressure. Thus, under normal atmospheric pressure, the boiling-point of ether is 35° C.; the normal boiling-point of pure alcohol is 78°; aniline boils at 183°, and the hydrocarbon picene at 520°. The boiling-temperature is, of course, very easy to determine; and since it is one of the highly characteristic properties of a liquid, a chemist determines that point usually before inquiring into other properties when called upon to identify a liquid compound. Further, since in the case of a pure chemical compound, if the vapors are allowed to escape, the boiling-temperature remains constant, while in the case of a solution (or any other homogeneous liquid mixture), it continuously rises; whenever a chemist wants to ascertain whether he is dealing with a single and pure chemical compound, he subjects his liquid to distillation, to see whether the boiling-point will remain constant. If it does not remain constant he knows that he is dealing with a mixture or that some chemical change is taking place in the liquid.

From the fact that every compound has a characteristic boiling-point of its own, chemists were naturally led to think: (1) that some definite relation must surely exist between the chemical nature of compounds and their boiling-points, and hence (2) that in comparing compounds of similar constitution, definite numerical relations should be expected to exist between the boiling-points of such compounds. As a matter of fact, in the homologous series of organic chemistry, the boiling-point is generally found to increase with the complexity of the molecule (see, for example, the article HYDROCARBONS); which shows that the boiling-point of compounds is really dependent on their nature and structure. The numerical relations hitherto discovered are, however, far from being definite and general. Probably we do not know as yet how to search for the more definite relations.

BOILLY, bwä'yē', LOUIS LÉOPOLD (1761-1845). A French painter, born at La Bassée (Nord). He was at first a portrait painter, and began working in Paris in 1779. He won a considerable popularity as a depicter of the bourgeoisie from the reign of Louis XVI. to the close of the Restoration. He has been credited with no less than five thousand pictures, many of them Revolutionary scenes, and the best belonging to the epoch extending from the Revolution to the Consulate. In design he is firm and accurate, in color generally even. Many of his works were engraved, and he himself did creditable lithographing. His two most famous paintings are perhaps "The Arrival of the Diligence" (1803) and "Isabey's Atelier" (with portraits of twenty-four artists).

BOIS D'ARC, bwä'därk'. See OSAGE ORANGE.

BOIS DE BOULOGNE, bwä *de* bōō'lō'ny'. A famous and beautiful park of Paris covering about 2250 acres. It derives its name from the town of Boulogne-sur-Seine on its south. The park was formed under Napoleon I. out of the old Fôret de Rouvray, and remained in the possession of the State until transferred to the city by Napoleon III. in 1852, since which time it has been the favorite drive of Parisians. The Bois was greatly injured by bombardment during the siege of Paris in 1870-71, but was soon restored. It contains the great Auteuil and Longchamp race-courses. With the races for the Grand Prix of Longchamp (100,000 francs), held in the early part of June, the Parisian season closes. The Bois contains also the Jardin d'Acclimatation. See PARIS.

BOIS DE CHYPRE, bwä' *de* shē' pr'. See ELM.

BOISDEFFRE, bwä'dĕfr', RAOUL FRANÇOIS CHARLES LE MOUTON DE (1839—). A French soldier, born at Alençon (Orne). He studied at the College of Saint Cyr and at the Staff-College. During the Franco-Prussian War he was a major of cavalry and aide-de-camp of General Chanzy, and in 1882 was promoted to be colonel. In 1890 he became assistant chief-of-staff, and in 1893 chief-of-staff. At the trial of Emile Zola (1898), during the Dreyfus agitation, he appeared full-uniformed in court, and in a much-applauded address to the jury, affirmed the existence of a third secret document incriminating the accused officer. When subsequently it transpired, through the confession of Lieutenant-Colonel Henry, that the document to which he had referred in good faith was a forgery, he tendered his resignation.

BOIS DE VINCENNES, văn'sĕn'. A park of 2250 acres on the west of Paris, formerly a hunting forest of Louis IX. A large part of the park is taken up by the Champ de Manœuvres, an infantry drill-ground, a race-course, and the polygone d'artillerie.

BOISE, boi'*ze*. A city, the county-seat of Ada County, Idaho, and capital of the State, 400 miles northwest of Salt Lake City, Utah, on the Boise River and on the Oregon Short Line Railway (Map: Idaho, A 4). It is the centre of an agricultural and mining district, and has large stock-raising interests; it is one of the most important inland wool markets in the United States, and controls a large general trade with southern Idaho. Water derived from the Boise River is utilized for irrigation, and also for power in the manufacturing industries. Natural hot water exists here in abundance, and is extensively used in heating the buildings of the city. Among the prominent features are a natatorium, the public library, several academies and a high school, business colleges, United States assay office, United States court, United States land office, the State capitol, penitentiary, and Soldiers' Home. Boise was settled in 1863, and in 1864, with a population of 300, it was organized as a city and became the capital of the State. Its charter provides for a mayor, elected biennially, and a single-chambered city council. Population, in 1890, 2311; in 1900, 5957.

BOISE, boiz, JAMES ROBINSON (1815-95). An American educator. He was born at Blandford, Mass., and in 1840 graduated at Brown University, where he was professor of Greek from 1843-50. From 1852 to 1868 he was professor of Greek language and literature at the University

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of Michigan, and from 1868 until his death filled a similar chair at the University of Chicago. During the latter period he was also professor of New Testament interpretation at the Baptist Union Theological Seminary (1877-95), and professor emeritus of New Testament Greek at the University of Chicago. In addition to several classical text-books, he published notes on the Epistles to the Galatians, Romans, Ephesians, Colossians, and Philippians.

BOISE, Otis Bardwell (1844—). An American musician and composer. He was born at Oberlin, Ohio, studied music in Leipzig and Berlin, and for some time was instructor in composition at the New York Conservatory and organist of the Fifth Avenue Presbyterian Church. From 1881 to 1888 he was in business in New York, and since then has been active in professional work in Berlin. His compositions include a *Concertstück* for piano and orchestra, and a G minor piano concerto. He has also written *Harmony Made Practical* (1900), and *Music and its Masters* (1901).

BOISGOBEY, bwä'gô'bâ', Fortuné Abraham du (1821-91). A sensational French novelist of criminal adventure and detection of crime. Characteristic tales are *Les gredins* (1873); *Chevalier Casse-cou* (1873); *Le demi-monde sous la Terreur* (1877); *La Vieillesse de M. Lecocq* (1878); *La main coupé* (1880); *La revanche de Fernande* (1882); and *La bande rouge* (1886). Many of his works are translated and adapted under titles that do not suggest the originals.

BOIS-GUILBERT, bwä'gêl'bâr', Sir Brian de. In Scott's *Ivanhoe*, a Knight Templar of inferior character who loves Rebecca and rescues her from a burning castle. When she is accused of sorcery he is appointed to meet her champion, Ivanhoe, in combat, but dies in the lists. Rebecca's innocence is thus deemed to be proved.

BOISGUILLEBERT, Pierre le Pesant, Sieur de (? -1714). A French political economist, born in Rouen. In 1690 he was appointed lieutenant-general (civil) of his bailiwick. He published in 1699 *Le détail de la France sous le règne de Louis XIV.*, and by a *Supplément au détail de la France* (1707), brought upon himself the wrath of the ministry and exile to Auvergne. The *Détail* he republished as *Testament politique de M. de Vauban* (1712). Under both styles this work violently attacks Colbert. It is, however, interesting both for its otherwise unobtainable information regarding the France of that day, and for its speculations as to the freedom of commerce and the importance of agriculture.

BOIS-LE-DUC, bwä'le-dụk' (Dutch *Hertogenbosch*, 'Duke's Forest'). The capital of the Dutch Province of North Brabant, and seat of a Catholic bishop, situated at the junction of the Dommel and the Aa (Map: Holland, D 3). Its fortifications were destroyed in 1876, but the natural situation of the town is very strong, as the surrounding country can be flooded, leaving only two roads passable. It is a clean, well-built town, about five miles in circumference, intersected by canals, and has a citadel called Papenbril. Bois-le-Duc has a very fine cathedral, the museum of the province with a collection of Roman and mediæval remains, academy of arts, a grammar school, several hospitals, etc. The town has thriving manufactures of gold and silver articles, shoes, woodenware, cigars, and mirrors. Its trade with the interior and its shipping are considerable. The population is chiefly Catholic, and numbers (1900) 44,034. Bois-le-Duc is a place of considerable antiquity, having been founded in 1184 by Godfrey III., Duke of Brabant. The surrounding forest was cut down by his son and successor, Henry, who strengthened the town with walls. In the Sixteenth Century Bois-le-Duc separated from the Dutch States, and was ineffectually besieged in 1601 and 1603 by Prince Maurice of Nassau, but had to surrender to a Dutch force in 1629. In 1794 the town was taken by the French; and in 1814 retaken by the Prussians. Consult Prempart, "The Siege of Bois-le-Duc," in *The Military Engineer* (London, 1759).

BOISSERÉE, bwä'srâ', Sulpiz (1783-1854). A German art critic and antiquary. He was born in Cologne, August 2, 1783. A visit which he and his brother Melchior (1786-1851), along with their friend Bertram, paid to Paris in 1803, inspired the trio with the idea of collecting and preserving the scattered specimens of early German painting. The realization of this idea became the single object of their lives. After years of research they had gathered at Heidelberg in 1810 a collection of nearly 200 pictures. In 1818 it was taken to Stuttgart, where the collection was arranged chronologically in a spacious building. This disclosed the fact that in the Fourteenth Century Germany possessed an original school of panel-painting, and that it was strongly modified by the Flemish masters, especially the Van Eycks, in the Fifteenth Century. In 1827 the collection was sold to the King of Bavaria for 120,000 thalers and, except for about forty which were taken to Nuremberg (now in the Germanic Museum), they became the nucleus of the Royal Pinakothek in Munich, to which place the brothers Boisserée followed it. In 1845 the two brothers removed to Bonn, and devoted all their energies to the study of the Cologne Cathedral, pleading for its completion. Sulpiz died May 2, 1854, Melchior May 14, 1851. They published lithographic plates of the gallery, and Sulpiz, who widened his studies to include all German mediæval art, wrote several valuable works on the Cologne Cathedral, on the architecture of the Rhineland, etc. Their collection became a valuable source for the study of primitive German painting. Sulpiz Boisserée had considerable influence on Goethe's studies of German art. His widow published a biography of her husband under the title, *Sulpiz Boisserée* (Stuttgart, 1862).

BOISSIER, bwä'syâ', Marie Louis Gaston (1823—). A French historian and archæologist, born in Nimes. He studied at the Ecole Normale, and was an instructor in rhetoric from 1847 to 1857, in Nimes, and subsequently at the Lycée Charlemagne of Paris. In 1861 he was appointed to the chair of Latin eloquence at the Collège de France, where he later was transferred to that of the history of Latin literature. In 1865 he became lecturer in Latin language and literature at the Ecole Normale. He was elected in 1876 to the French Academy, in 1886 to the Academy of Inscriptions and Belles-lettres. In addition to extensive contributions to the reviews, he has published a number of scholarly works, written

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in a style at once clear and distinctive, and including *Le poète Attius* (1857); *Etude sur la vie et les ouvrages de Terentius Varron* (1861); *La religion romaine, d'Auguste aux Antonins* (1883); *La fin du paganisme* (1894); and, in particular, *Cicéron et ses amis* (1892) and *Promenades archéologiques, Rome et Pompéi* (1892), two reconstructions of antiquity remarkable for vividness and the minute accuracy of their details.

BOISSIEU, bwä'syē', JEAN JACQUES (1736-1810). A French painter and engraver, born in Lyons. He studied painting under Lombard and Frontier, and engraving under Wille, and won recognition with his landscapes. He was appointed a *trésorier* in the bureau of general finance, in Lyons, and subsequently became distinguished as the foremost French aquafortist. Among his paintings is "Valley with River" (1773, Berlin Museum). His engravings include much original work, as well as numerous landscapes after Ruysdall, Winants, and others.

BOISSONADE, bwä'sô'nàd', GUSTAVE-EMILE (1825—). A French jurist, the son of Jean François Boissonade, the Greek scholar. He was born in Vincennes. He is best known through his important mission to Japan, where he went in 1873 to draw up the principal codes for the Japanese Government. M. Boissonade is, moreover, the author of the following valuable books: *Histoire des droits de l'époux survivant* (1852), *Histoire de la réserve héréditaire* (1873)—both crowned by the Académie des Sciences Morales; *Projet revisé de code de procédure criminelle* (1882); *Projet revisé de code pénal* (1886). He was decorated with the Legion of Honor in 1881.

BOISSONADE, JEAN FRANÇOIS (1774-1857). A French classical scholar. He was born in Paris, August 12, 1774, of a noble Gascon family. He was originally intended for an administrative career, but renounced it for philology. He soon made himself known to the learned world by his contributions to the philological journals, and was appointed professor of Greek in the University of Paris in 1812. In 1813 he was admitted to the Academy of Inscriptions, and in 1828 he succeeded Gail as professor of Greek literature in the Collège de France. His most important works are: *Philostrati Heroica* (1806); *Marini Vita Procli* (1814); *Tiberius Rhetor de Figuris* (1815); *Sylloge Poetarum Græcorum*, 24 vols. (1823-26); *Babrii Fabulæ* (1844).

He contributed in his earlier years numerous papers on philological subjects to Parisian, English, and German journals, and gave the cause of classical study in France a powerful and still perceptible impulse by his eloquent and attractive lectures from his chair. In addition to his many and laborous works in classical philology, he also signalized himself as a French lexicographer and belle-lettrist, and was one of the most copious and valued contributors to the *Biographie Universelle*. He died September 8, 1857.

BOISSY D'ANGLAS, bwä'sē' dän'glàs', FRANÇOIS ANTOINE, Count (1756-1826). A French statesman, born at Saint Jean-le-Chambre, in the Department of Ardèche. In 1789 he was elected a deputy of the States-General. While a member of the Constituent Assembly, he was accused of plotting to change the French monarchy into a Protestant republic. After the execution of Robespierre, whom he helped to overthrow, he became a member of the Committee of Public Safety (1794), and proved himself a man of marked ability. He was director of the supply of provisions for Paris during the riotous and sanguinary proceedings of the 12th Germinal and 1st Prairial in the year III. of the Republic, and in this capacity met the popular menaces with singular firmness. Subsequently he became president of the Council of Five Hundred; was a Senator under Napoleon, and a peer under Louis XVIII. He wrote *Recherches sur la vie, les écrits et les opinions de Malesherbes* (1819) and *Etudes littéraires et poetiques d'un vieillard* (1825).

BOISTERER. The name of a servant in *Fortunio*, a fairy tale by the Countess d'Aulnoy.

BOITO, bô-ē'tô, ARRIGO (1842—). An Italian composer, born in Padua. It is an anomalous fact that Boito owes his musical fame to an opera, *Mefistofele*, which has been a comparative failure, and that this work, despite its apparent lack of lasting popularity, should be considered epoch-making—one of the most important Italian musical products of the Nineteenth Century—because it forms the pivotal point on which Italian opera turned from mere tunefulness to the new dramatic school exemplified in the later Verdi and in Ponchielli, Mascagni, Puccini, and Leoncavallo. The writing of the libretto, the composition and remodeling of this 'remarkable failure' occupied Boito for nearly twenty years. The son of cultured parents—his father was an Italian painter, his mother a Polish woman, a parentage which is supposed to account for the blending of southern and northern temperament in his artistic nature—he entered the Milan Conservatory in 1856. While studying there he composed the garden scene in *Mefistofele* and other portions of the work. But the score was not finished and rearranged for stage production until 1868. Meanwhile, Boito had done much literary work and had lived in France, Germany, and Poland. *Mefistofele* was produced on March 5, 1868, at La Scala, Milan. The performance lasted six hours, and though it had several repetitions (amid scenes of disorder, due to hissing and applause, which caused the work to be withdrawn by order of the public authorities), its failure was undoubted. Boito again remodeled the opera, among other changes making Faust a tenor, instead of a baritone, rôle. In 1875 the revised version was produced in Bologna with great success, which was repeated in other European cities. Nevertheless, it has not maintained itself as a popular opera in the *répertoire*. The difficulty seems to be that Boito has attempted to cover too much of the Faust legend in a single work. Gounod's *Faust*, especially when given without the Brocken scene, tells a consecutive story of love, betrayal, and death. In *Mefistofele* the story is episodic—delayed by a prologue, and interrupted not only by the Brocken, but by the classical scene in which Marguerite reappears as Helen of Troy to the utter mystification of the greater portion of an operatic audience, so that however fine they may be musically, these parts of the work detract from the impression as a whole. Boito's music, though showing traces of such utterly different geniuses as the early Verdi and Wagner, is, nevertheless, a notable

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achievement and the most musicianly score brought forward by an Italian prior to the new Italian school. Marguerite's death is one of the most dramatic and deeply moving scenes in all opera. In this country *Mefistofele* was produced at the Metropolitan Opera House, New York, in 1883, with Campanini and Nilsson. A noteworthy revival occurred at the same house in 1896 with Calvé as Marguerite and Edward de Reszke as Mefisto, and another in 1901 with Plancon in the title-rôle. Boito's other operas, *Ero e Leandro*, *Nerone*, and *Orestiade*, have never been performed. The libretto of the first-named he afterwards gave to Bottesini (q.v.) and to Mancinelli (q.v.). He also wrote the libretti for Faccio's *Amleto*, Ponchielli's *Gioconda*, and for Verdi's *Otello* and *Falstaff*. Boito is a Cavaliere, a Commendatore, and an officer of the Legion of Honor.

BOIVIN, bwä'văn', MARIE ANNE VICTOIRE GILLAIN (1773-1841). A French midwife. She was educated in a convent and studied anatomy and midwifery at Etampes with a relative, the superior of the *hospitalières*, and afterwards at the Hôtel Dieu of the same place. She received the degree of M.D. from the University of Marburg. After the death of her husband she took the place of midwife in the Maternity Hospital, and in 1801 became chief overseer. She caused the establishment by Chaptal of a special school of accouchement. She refused the brilliant offers of the King of Prussia in order to remain at her modest post. Her *Mémorial de l'art des accouchements* (1812) is a well-known work.

BOJADOR (bō'zhä-dôr') CAPE (Portug., one that juts or bulges). A headland on the western coast of Africa, in latitude 26° 7′ N., longitude 14° 30′ W., at the northern coast boundary of the Spanish possessions (Map: Africa, C 2). In consequence of its extreme flatness, and the shoreward tendency of the currents, the coast, extending northward to Cape Nun, abreast of the Canary Islands, is very dangerous for navigation. The Portuguese doubled this cape in 1433, and from them it received its name Bojador Cape, signifying 'a round cape.'

BOJANO, bô-yä'nô (anciently, Samnite *Bovianum*, Gk. Βοιανον, *Boianon*). A city in the Province of Campobasso, in Abruzzi and Molise, south Italy, on the Biferno, 18 miles southwest of Campobasso (Map: Italy, J 6). It lies in a deep valley on the northeastern slope of the Matese Mountains, which for four months of the year shut off the light of the sun. It is the seat of a suffragan bishop, and has a cathedral, five churches, and a seminary. There are ruins of a Roman theatre and a temple, and of the walls of the ancient Bovianum, which during the Samnite wars was often besieged. During the Second Punic War it was several times the headquarters of the Roman Army, and in the great Social War the Confederates, on the fall of Corfinium, made it their capital. It has suffered greatly from earthquakes, especially in 1805. Population of commune, in 1901, 6337.

BOJAR, bô-yär'. See BOYAR.

BOJER, bō'yēr, JOHAN (1872—). A Norwegian author, born in Drontheim. His works include the historical drama *Olaf den Hellige* (1897, "Saint Olaf"), and the stories *Helga* (1895) and *Den evige Krig* (1899).

BO'KER, GEORGE HENRY (1823-90). An American poet, dramatist, and diplomatist, born in Philadelphia. He was the son of a banker, graduated at Princeton in 1842, studied law, but did not practice, and after a tour in Europe published a volume of poems, *The Lesson of Life* (1847). His tragedy *Calaynos* (1848) was staged with success, and he produced many others: *Anne Boleyn; Leonor de Guzman; Francesca da Rimini; The Betrothed;* and *The Widow's Marriage*. Of these, *Francesca da Rimini* is considered the best. It has been revived several times by Barrett and other actors. Boker collected his *Plays and Poems* in two volumes in 1856. The Civil War inspired him to much patriotic poetry, which made up his *Poems of the War* (1864). Later volumes of verse were: *Street Lyrics* (1869); *Königsmark and Other Poems* (1869); *The Book of the Dead* (1882); and *Sonnets* (1886). The interval between these last volumes he spent largely in diplomatic service. He was appointed minister to Turkey in 1871, and transferred to Russia in 1875, where he remained till 1879. Boker's poems and dramas are much above the average in style and power, but have never achieved real popularity. The aftermath of his muse is a volume of *Sonnets* published in 1886.

BOKELMANN, bō'kel-mân, CHRISTIAN LUDWIG (1844-94). A German painter. He was born at Saint Jürgen, studied under Wilhelm Sohn at the Düsseldorf Academy, and won a reputation as a painter of portraits and of genre pictures, both humorous and serious. The best of his works are "House of Sorrow" (1873); "Pawnbroker's Shop" (1876); "Opening of the Will" (1879); and "Portrait of Klaus Groths." His subjects are taken from modern life and are vivid representations of such scenes as occur in any large city. There are usually many figures in his pictures, grouped against an impressive architectural background.

BOKHARA, bo-kä'-rä, or BUKHARA. A Russian protectorate in Central Asia, bounded by Russian Turkestan on the north, the Pamir region on the east, Afghanistan on the south, and the Russian Trans-Caspian Territory and Khiva on the west (Map: Central Asia, E 2). It lies approximately between latitudes 37° and 42° N. and longitudes 62° and 72° E. The extent of its area cannot be ascertained with accuracy, owing to the unsettled state of some of the boundary lines. General estimates vary from 80,000 to 93,000 square miles.

A considerable extent of the country consists of desert land and steppes, interspersed with fruitful oases. The eastern part is very mountainous. The most fertile and cultivated regions are found along the rivers. The chief river is the Amu Darya, which forms the southern boundary and flows close to the western boundary, and with its tributaries drains a large part of the country. The Serafshan flows through the northwestern part, losing itself in the sands a short distance from the Amu Darya. The climate is warm and generally healthful. The summers are hot, and the winters very cold, with considerable snowfall. The rainfall is very scant, and occurs mostly in the spring.

Agriculture forms the chief occupation, and according to current estimates about 10 per cent. of the total area is under cultivation. The

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dry climate of Bokhara makes it necessary to utilize almost all the smaller rivers for irrigation. The chief agricultural products are wheat, rice, barley, tobacco, lucerne, flax, cotton, and dye-plants. There are also produced large quantities of fruit, including several varieties of grapes, peaches, apricots, and nuts. Silk-culture is carried on. Cattle-raising has always been one of the most important occupations of Bokhara, the native sheep being especially known for the wool used extensively in Russia for sheep-skin coats. Horses, goats, and camels are also raised in large numbers. The manufacturing industries of Bokhara are chiefly confined to the production of textiles, and are carried on on a very small scale and by the most primitive methods. The chief products are cotton and woolen fabrics, silk, coarse cloth, and a kind of felt called *koshma*, leather goods, including footwear and saddles, and small metal products, such as knives, locks, etc. The mineral industry is as yet undeveloped, although Bokhara is supposed to be very rich in minerals. The chief minerals worked are salt and gold, the latter worked by the Russians in Safet-Darya.

The foreign *commerce* of Bokhara is quite important, owing to its central location, and Bokhara, the capital, although it has lost a considerable portion of its commercial importance and splendor, is still considered an important seat of commerce in Central Asia. The trade is chiefly with Russia, India, and Persia, and is carried on mostly by means of caravan routes and the Trans-Caspian Railway, as the wagon-roads of Bokhara are very few and in poor condition. The annual trade with Russia is estimated at about $10,000,000, and the entire foreign trade of Bokhara at about $15,000,000. The Trans-Caspian Railway, which runs through Bokhara for about 186 miles, has had a very good effect on the commerce of the country, which has considerably advanced under the protection of Russia. Bokhara, the capital, is connected by telegraph with Tashkent. In its form of *government*, Bokhara is an absolute monarchy, the Ameer being invested with unlimited powers. The immediate administration is in the hands of several high officials, each at the head of a separate department. For purposes of administration, Bokhara is divided into several districts, administered by beks, who are obliged to turn in a certain sum of money every year into the treasury of the Ameer, in addition to suitable gifts, consisting mostly of cattle and other products. The beks are not paid by the Government, but are expected to get their share out of the taxes collected by them. The army consists of a regular force and a militia, and is recruited chiefly from volunteers; but in case of a holy war, every Mussulman capable of bearing arms is liable to military service. The standing army is estimated all the way from 15,000 to 30,000 men. There are about 20 guns, mostly made of copper, and the regular army is, to a certain extent, organized after European fashion.

The *population* is estimated at from 2,500,000 to 3,000,000. It consists of Uzbegs, Kirghizes, who are largely nomadic, Tadjiks, Turkomans, Arabs, Afghans, Sarts, Persians, some Jews and Russians. The prevailing religion is Mohammedan. With the exception of Bokhara (q.v.), the capital, and Samarkand, there are few towns of any importance.

HISTORY. Under the name of Transoxiana, Bokhara was inhabited in antiquity by Iranian tribes professing Zoroastrianism. At a very early period the country was invaded by Turanian newcomers, who were Buddhists, and a long struggle ensued between the two, in which the difference in religion played no less important part than that of race. Under the Arabs, who brought with them the faith of Islam, Bokhara was a field of incessant contests and fighting, until, with the rise of the Samanid dynasty, in the latter part of the Ninth Century, it became a mighty monarchy, the bulwark of Islam, and a great centre of learning. The dominions of Bokhara at that time reached down into Afghanistan and Khorasan. At the beginning of the Eleventh Century, the country, together with much of the Mohammedan world, was conquered by the Seljukian Turks. Under the rulers of that period (1004-1133), Iranian and Arabic continued as the languages of culture, Turkish being employed by the Court for conversation only. After that Bokhara was a bone of contention between competing rulers, until conquered by Jenghiz Khan in 1218, when the capital was burned to the ground, the kingdom devastated, and most of the inhabitants slain. For nearly two centuries the invaders ruled over Bokhara. Having embraced Mohammedanism, they favored their kindred, the Turks, so that the latter soon gained the ascendency. Under Timur, or Tamerlane (died 1405), Bokhara became of great political and commercial importance, its capital, Samarkand, being full of gorgeous palaces, splendid mosques, and very extensive gardens. After his reign, however, it became the arena of bloodshed and wars for nearly a hundred years, until conquered by the Turko-Mongolian Uzbegs about the year 1500, which marks the beginning of Bokhara's decline. With the single exception of the scholarly Abdullah-Khan (in the Sixteenth Century), her monarchs have been typical Oriental rulers, cruel and steeped in fanaticism. Nasr-Ulla-Khan (1827-60) was perhaps the most infamous in a long series of infamous potentates. It was he who caused, in 1842, the death of Colonel Stoddart and Captain Conolly, who went on a mission to Bokhara. Dr. Wolff, who visited the country in 1844, with a view to ascertain their fate, narrowly escaped with his life, after a detention of some months. By the middle of the Nineteenth Century the steady, aggressive expansion of Russia in Central Asia cast a shadow on the Khanate of Bokhara, and a clash of arms became imminent, unless the Khan were to submit to the rule of the Czar without resistance. In 1865 the Russians occupied Tashkent, and Khan Mozaffar-Eddin, son of Nasr-Ulla, accepted this as a challengh to open hostilities. He took the field in person, but his army was badly defeated at Irjar, on May 20, 1866. The Russians now pushed farther, and after many successful battles entered Samarkand, in May, 1868. The fortress of Katti-Kurghan was then stormed and taken, and on June 14 the Ameer was completely defeated on the Zerabulak Heights. By the terms of the peace concluded in July, 1868, Samarkand, and the Katti-Kurghan, Penjekent, and Urgut districts—the best portions of the Zerafshan Valley—were ceded to Russia. Besides paying 500,000 rubles indemnity, the Ameer granted special privileges to Russian trade. This final blow brought Bo-

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khara into Russian vassalage. In return for complete obedience, the Russians gave the Ameer active assistance in suppressing revolt within his possessions. Thus, in 1868, the Russians dispersed the hordes of rebels who wanted to enthrone the Ameer's eldest son, Abdul-Malik-Mirza. After the Russian expedition against Khiva (1873), Bokhara was given a large strip of Khivan territory for supplying the Russian army of invasion with camels and provisions. In 1877 the territory of Bokhara was expanded eastward by the conquest of Darwaz and Karategin. In 1885 the present Ameer, Sayid-Abdul-Ahad, came to the throne. In 1886 he abolished slavery. He visited Saint Petersburg in 1893, and left there the heir to the throne to be given a Russian education. The Ameer has now become a mere puppet in Russian hands.

Consult: Vâmbéry, *History of Bokhara from the Earliest Period to the Present Time* (London, 1873); Curzon, *Russia in Central Asia* (1889) and *The Pamirs and the Source of the Oxus* (London, 1897); Le Messurier, *From London to Bokhara* (London, 1899); O'Donovan, *The Merv Oasis*, 2 vols. (London, 1880); Réclus, "Asiatic Russia and the Middle Asiatic Khanates," in *Universal Geography* (Paris, 1876-94); Capus, *A travers le royaume de Tamerlan* (Paris, 1892); Rickmers, "Travels in Bokhara," *Geographical Journal*, Vol. XIV. (London, 1899).

BOKHARA (Mongol. *bukhar*, church). The capital of the khanate of the same name, and one of the most important commercial centres of Central Asia, situated in a valley near the river Zerafshan, and only a few miles from the Trans-Caspian Railway (Map: Central Asia, E 2). It is irregularly built and surrounded by a high mud wall. The streets are narrow and crooked and mostly unpaved. The houses, built, as a rule, of mud or clay, are low and without windows on the streets. Bazars, both covered and open, are numerous and well stocked with Oriental wares as well as with European manufactures. Bokhara has as many mosques as streets, but only a few of them are noteworthy. The chief of them is the Mirghara, surmounted by a cupola 100 feet high, covered with blue tiles. Adjoining it is the high minaret which was used until 1871 for the execution of criminals by hurling them from its top. The citadel is situated on an artificial elevation, and contains the palace of the Ameer, the houses of the higher officials, the jail, and the water-cisterns. The city is intersected in several directions by a canal, which is spanned by numerous bridges. Bokhara is regarded as a centre of culture in Central Asia, and contains about sixty high *medresses* and a large number of minor ones. There are a considerable number of manufacturing establishments, producing silk fibres, coarse cloth, blades, and other metal articles. The commerce is carried on to a large extent in articles of Russian manufacture, textiles, leather articles, etc. A few miles distant from the capital, on the railway line, is situated a small Russian settlement named Russian Bokhara, and containing about 300 inhabitants. The population of the capital is estimated at 60,000.

BOKHARA CLOVER. See MELILOT.

BOL, bŏl, FERDINAND (1616-80). A Dutch painter and etcher, born in Dordrecht. He was the favorite pupil of Rembrandt in Amsterdam, and much influenced by him in his early career, but later adopted a style differing materially from that of his master. His biblical and historical compositions are less satisfactory than his portraits, for which he was highly esteemed. His principal works are to be found in Gouda, Leyden, and Amsterdam. Noteworthy also are "Repose in Egypt," "Jacob's Dream," and "Joseph Before Pharaoh," all in the Dresden Gallery. One of his best-known portraits is that of Rembrandt's wife, Saskia, in the Brussels Museum.

BO'LA BO'LA, or BO'RA BO'RA. One of the Society Islands (q.v.), about 200 miles to the northwest of Tahiti, in latitude 16° 30′ S. and longitude 152° E. (Map: World, L 6). It rises to a height of nearly 2400 feet, is fertile, and has a population of about 1800 inhabitants.

BO'LANDEN, KONRAD VON. See BISCHOFF, JAMES EDUARD KONRAD.

BOLAN (bō-lăn′) **PASS.** A defile in the mountains of British Baluchistan on the great highway leading up from the Indus via Shikarpur, Dadar, and Quettah to Kandahar. It extends northwestward from the neighborhood of Dadar, for a distance of about 55 miles, until it reaches a plateau nearly 6000 feet above the sea. The average ascent is about 90 feet to the mile. It is bounded throughout by eminences 500 feet in height. A military railroad has been constructed by the British at great expense through the Bolan Pass to connect Sindh with Kandahar. It is now completed as far as the border of Afghanistan.

BOLAS, bō'lăs (Sp. *bola*, ball, from Lat. *bulla*, bubble, round object). A hunting weapon used by various tribes of Mexico and South America, particularly those of the Pampas. It consists of three leather-covered balls of clay or stone, radiating from a central knot and attached to the end of a stout rawhide rope. It is thrown from horseback in such a way as to entangle the legs of the animal and hold it until the hunter comes up.

BOLBEC, bŏl'bĕk′. A town of France in the Department of Seine-Inférieure, about 18 miles from Havre (Map: France, G 2). The Bolbec, on which it stands, supplies water-power for its mills, where cotton, woolen, and linen goods are manufactured. It has also considerable trade in grain, horned cattle, and horses. Population, in 1896, 12,239. Consult "Cités Ouvrières de Bolbec," in *Nouvelles Annales de la Constitution* (Paris, 1878).

BOLDINI, bŏl-dē′nē, GIOVANNI (1845—). An Italian painter. He was born in Ferrara, studied at the Florence Academy, and worked for some time in London. He is known for his genre pictures, landscapes, and portraits. The last, by reason of accuracy and finish in drawing and skill in characterization, are particularly excellent. His works, many of which are in American private collections, include the following: "The Connoisseur," "Gossips," "Delivering the Despatch," "Kitchen Garden," and "Portrait of Menzel."

BOLDREWOOD, bŏl'dĕr-wŭd, ROLF (Thomas Alexander Browne). See AUSTRALIAN LITERATURE.

BOLD STROKE FOR A HUSBAND, A. The title of a comedy by Mrs. Hannah Parkhouse Cowley (1782). It has two plots. In one,

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Olivia wins Julio by steadily refusing all lovers until he becomes conscious of her attractions. In the other, a married woman disguises herself as a boy, Florio, to recover from her husband's mistress the fortune he has given away.

BOLD STROKE FOR A WIFE, A. The title of a comedy by Mrs. Susannah Centlivre (1718). It deals with the diplomacy with which Colonel Feignwell wins the orphan heiress, Anne Lovely, and her dowry of £3000. He accomplishes his purpose by flattering his mistress's impossible guardians, a beau, a dilettante, a broker, and a Quaker.

BOLE (Gk. *βῶλος, bōlos,* lump of earth, clod, nugget). A hydrous aluminium silicate that is found massive, and constitutes a variety of halloysite. It is a claylike body, containing more or less iron oxide, which gives it a yellowish to red-brown or dark color. It has a conchoidal fracture, and when thrown into water falls to pieces. It is unctuous to the touch, and some varieties adhere to the tongue. It is found in Armenia, Italy, France, Germany, Ireland, Scotland, and South America. Bole is used as food by the natives of certain parts of South America, and by the Japanese it is favorably regarded as a means for producing leanness. *Armenian bole* is of a bright red color, due to the oxide of iron that it contains, and has been used as a dentifrice. It has also been prescribed as a tonic and as an astringent medicine, finding in recent years its most important use in veterinary practice. *Lemnian bole* is of similar character, and is obtained from the island of Lemnos. When calcined, washed, and ground it is applied as a pigment, and is known variously as *Blois bole,* which is yellow in color; *Bohemian bole,* which is yellowish-red; *French bole,* which is pale-red; and *Silesian bole,* which is pale-yellow.

BOLERO, bō-lā'rō (Sp.). A Spanish national dance, mostly in the time of a minuet, with a sharp, marked, and peculiar rhythm. It is accompanied with the castanets and the cithern, and frequently with the voice; and the dancer in the movements seeks to represent the different degrees of feeling from coyness to the highest ecstasies of love.

BOLE'TUS (Lat. *boletus,* from Gk. *βωλίτης, bōlitēs,* a kind of fungus). A genus of fungi of the order Hymenomycetes, family *Polyporaceæ.* The older botanists included it in the numerous species now forming the genus Polyporus (see AMADOU; DRY-ROT) and other genera; but even as now restricted, it is a very extensive genus. Many of the species resemble the common mushroom and other species of Agaricus in form; but instead of gills, the under side of the cap (*pileus*) is occupied by a layer quite distinct from it in substance, and pierced by pores so as to be composed of a multitude of small tubes on the inside of which the spore-cases or seed-vessels are produced. Some of the species are edible. Boletus edulis is much used in France; also in Germany, Hungary, Russia, etc. It is the *ceps ordinaire* of the French markets. It grows on the ground in woods, in places covered with moss, heath, or grass. In moist, warm summers, it sometimes appears in immense quantities, attaining a size of six inches or more across. The tubes are removed along with the skin and stem, and only the flesh of the cap is eaten, which is firm, white, delicate, of agreeable smell, and is prepared like the common mushroom. For illustrations, see Colored Plate under MUSHROOMS.

BOLEYN, bul'en, ANNE (1501?-36). Queen of England as second wife of Henry VIII. She was the mother of Queen Elizabeth. The date of her birth is given as 1501 or 1507, the former being the more probable. The family name is frequently found in contemporary writings as Bullen, Bouleyn, Boullan, or Boulain. She was the daughter of Sir Thomas Boleyn, afterwards Earl of Wiltshire and Ormond. In her twelfth year Anne went to France, where her elder sister, Mary, had previously accompanied Mary Tudor, the affianced bride of Louis XII. of France, and sister of Henry VIII. She remained at the French Court three years, and soon after her return to England was wooed by Lord Henry Percy, the heir to the earldom of Northumberland, and by King Henry himself, who, in April, 1522, began to shower wealth and honors on her father, and before this had dishonored her sister Mary. Henry's 'religious scruples' regarding the lawfulness of his marriage with Catharine became too urgent for the slow decision of the Court of Rome, but not till the King's divorce was set afoot (in May, 1527) did Anne favor his addresses. However, long before Cranmer pronounced the divorce (May 23, 1533), she was Henry's mistress, and in the preceding January they had been secretly married. She was crowned with great splendor in Westminster Hall on Whitsunday; but within three months Henry bade her "shut her eyes to his unfaithfulness, as her betters had done, for he could abase yet more than he had raised her." His cooling passion was not revived by the birth (September, 1533) of the Princess—afterwards Queen—Elizabeth. The new Queen, naturally light and gay of heart, and educated at the French Court, where these qualities were likely to be developed to the utmost, conducted herself toward the courtiers with an easy familiarity not customary in England for one in her position. Concerning the first two years of her married life we have little information. It is said that she was favorable to the Reformation, and promoted a translation of the Bible. In January, 1536, the Queen gave premature birth to a son. The mishap is said to have been caused by learning of the King's newly developed passion for Jane Seymour, her successor. The King became more and more estranged, and her freedom of manners had given but too good grounds for her enemies to speak evil of her. On May 1 the annual tournament was held at Greenwich, in the presence of the King and Queen. The tilting had commenced, the challengers being Viscount Rochford, brother to the Queen, and Sir Henry Norris, one of the gentlemen of the King's Privy Chamber. Suddenly the King rose, his outward bearing manifesting inward disturbance, left the tourney, and with a small party rode up to London, leaving the Queen at Greenwich. The popular account is that the King had seen her drop a handkerchief into the lists in order that one of her presumed lovers might wipe his face; but the necessity for any such romantic and sudden pretense of jealousy is annulled by the fact that in the previous week a commission composed of members of the Privy Council had been secretly engaged in examining charges of adultery against Anne; indeed, two of her alleged accomplices, Sir William Brereton, a gentleman

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of the King's household, and Mark Smeton, a musician at Court, had already been arrested. The Queen remained at Greenwich that night. On the following morning she was examined before the Privy Council, and protested her innocence. In the afternoon she was sent up the river to the Tower. Sir Henry Norris, and Sir Francis Weston, another courtier, along with Smeton, were also examined, and all at first declared their innocence of the charge imputed to them; but under torture, the musician confessed to the crime. In the Tower, the Queen's every action and word were watched and reported; but anything she said while a prisoner seems quite as compatible with innocence as guilt. Her letter to Henry, written on May 6, speaks decidedly in her favor, but this letter is now supposed to be a fabrication of the time of Elizabeth. On the 10th of May the Grand Jury of Middlesex found a 'true bill' on the indictment which charged the Queen with committing adultery with no less than five persons, including her own brother, Lord Rochford, and of conspiring with them, jointly and severally, against the life of the King, the adultery being alleged to extend over a period of nearly three years. On the 11th the Grand Jury of Kent also found a true bill. On the 12th the four commoners, Brereton, Weston, Norris, and Smeton, were found guilty, the last confessing to the charge of adultery only, the other three pleading not guilty to both charges. With her case thus prejudged, on the 15th, the Queen and her brother were tried before 27 peers. Their uncle, the Duke of Norfolk, was president, and their own father was one of the judges. The accused affirmed their innocence, but were found guilty and condemned, the Queen to be burned or beheaded on the Tower Green. On the 17th Smeton was hanged, and the other four beheaded; general protestations of unworthiness by them at the hour of death being regarded by some historians as evidence of guilt. On the 19th the Queen was beheaded, with her last words praying a blessing on Henry, who, she said, had ever been to her a good and gentle lord, but making no confession of guilt. Henry married Jane Seymour the next day.

It is difficult to form anything like a just and satisfactory estimate of the character of Anne Boleyn—historians, for the most part, having made her but a lay figure upon which to hang the drapery of religious partisanship, or to display the colors of individual sympathy. That she was guilty of adultery with Henry is certain; but that she was guilty of the other heinous offenses laid to her charge remains at least not proved, and it is a suspicious fact that every trace of evidence has vanished. The character of this 'mother of the English Reformation' was not saintly; but she was not the Jezebel that Saunders, the Jesuit, would have us believe. According to him, she was even in person ugly, misshapen, monstrous; but although Holbein's portraits do not confirm the statements of others that she was 'comely,' we know that she had beautiful eyes and hair, and that her only positive defect was a supplemental nail. Consult: Strickland, *Queens of England*, Vol. II. (London, 1875-80); Froude, *History of England* (New York, 1871); Lingard, *History of England*, Vol. VI. (Boston, 1853-56); Green, *History of England*, Vol. II. (New York and London, 1899); Dixon, *Two Queens* (London, 1873-74); Wyat, *Extracts from Life of Queen Anne Boleigne* (London, 1817-25); and especially Friedmann's critical *Anne Boleyn* (London, 1885). Original materials are contained in Brewer and Gairdner (ed.), *Letters and Papers of Henry VIII.*; Ellis, *Original Letters* (London, 1824—); "Love-Letters from Henry VIII. to Anne Boleyn," in *Harleian Miscellany*, Vol. III. (London, 1744, 1808); and Wriothesley, *Chronicle* (Camden Society, 1875-77).

BOLGARY, bôl-gä'rĭ (Russ., the Bulgarians). Also called USPENSKOYE. A village in the Russian Government of Kazan, near the Volga, about 16 miles from Kazan, and four miles from the Volga. It is well known for the historical remains it contains in the form of buildings, walls, minarets, etc. It occupies the site of Bolgar, called by the Russian chroniclers Veliki Gorod (the 'Great Town'), capital of the old Bulgarian kingdom. The time of its foundation is unknown. But in the writings of Ibn-Khankal, in the latter half of the Tenth Century, it is stated that after the town had been ravaged by two victorious Russian armies, it still had a population of about 10,000. At a much later period, when Bolgary was conquered by the Mongols, the old capital declined considerably. Sacked and almost destroyed by Timur (Tamerlane) in the Fourteenth Century, it was completely ruined at the time of the fall of the 'Golden Horde.'

BOLGRAD, bôl-gräd' (for *Byelgrad;* see BELGRADE for derivation). A town in the Russian Government of Bessarabia, situated about 75 miles southwest of Akerman (Map: Russia, C 5). It has some trade in grain and produces brick and tallow. Population, in 1897, 12,388, mostly Bulgarians.

BO'LI, or **BO'LY** (corrupted in popular speech from Gk. πόλις, *polis*, the city, from Hadrianopolis; cf. Turk. *Stambul*, Constantinople, for εἰς τὴν πόλιν *eis tēn polin*, to the city). A town of Asiatic Turkey in the Vilayet of Kastamuni, on the left bank of the river Boli, and 136 miles east of Constantinople (Map: Turkey in Asia, E 2). The town occupies an eminence at the extremity of a fertile plain. It has several mosques, baths, and cotton and woolen mills. Boli is on the caravan route from Constantinople to Erzerum. Population, estimated at from 5000 to 10,000.

BO'LIDE. See METEORS.

BOLIN, bō'lēn, ANDREAS WILHELM (1835—). A Russo-Swedish scholar, philosopher, and author. He was born in Saint Petersburg, studied in Helsingfors, and was appointed university librarian there, with the title of professor, in 1873. In philosophy he is a disciple of Ludwig Feuerbach. He has published in Swedish an edition of Shakespeare (Hagberg's translation) and several original works, including *Undersökning of läran om viljans frihet* (1868). In German he has written *Ludwig Feuerbach, sein Werk und seine Zeitgenossen* (1891), and many essays for periodicals.

BOLINGBROKE, bŭl'ĭng-brŭk. The name of a character in Shakespeare's *Henry VI.*, part 2, who prophesies the deaths of the Dukes of Somerset and Suffolk.

BOLINGBROKE, bŏl'ĭng-brŭk, *formerly* bŭl'ĭng-brŭk, Viscount HENRY ST. JOHN (1678-1751). An English statesman, orator, and author. He was born at Battersea, October 1, 1678. He was

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educated at Eton, and, it is said, at Oxford; but the only ground for this assertion is that of the honorary degree conferred upon him by the university in 1702. During 1698-99 he resided on the Continent, and acquired a knowledge of the French language, which was afterwards of service to him. His early manhood was notorious for extreme licentiousness, but having entered Parliament in 1701, he devoted himself to politics, and joining the Tory Party, soon made himself prominent as an orator. In 1704 he was made Secretary of State for War. This office he retained till 1708, when the Whigs came into power, after which he retired from politics, and gave himself up to study, but still retained great influence as the Queen's favorite counselor. On the fall of the Whig Party in 1710, he was made Secretary of State for Foreign Affairs. In 1712 he was called to the House of Lords with the title of Viscount Bolingbroke, and in 1713, against the wish of nearly the entire nation, concluded the Peace of Utrecht. Having previously quarreled with his old friend Harley—now Earl of Oxford, and his most powerful rival—he contrived his dismissal in July, 1714, and immediately proceeded to form a strong Jacobite Ministry, in accordance with the well-known predilections of his royal mistress. Her death, however, a few years after, disconcerted his schemes, and the accession of George I. proved a deathblow to his prospects. On the 28th of August he was deposed from office; in March, 1715, he fled to France, and in August of the same year was attainted. For some time he held the office of Secretary of State to the Pretender; but his restless and ambitious spirit yearned for the 'large excitement' of English politics. His efforts to obtain a pardon not proving in the meantime successful, he retired to a small estate which he had purchased near Orleans. In 1718 his first wife died, and in 1720 he married the rich widow of the Marquis de Vilette. A judicious use of this lady's wealth enabled him to return to England in September, 1724. His property was restored to him, but he was never permitted to take his seat in Parliament. He therefore betook himself to his villa at Dawley, near Uxbridge, where he occasionally enjoyed the society of Swift, Pope, and others of his old friends, with whom he had corresponded in his exile, and where he diversified his moral and metaphysical studies by his attacks on the Ministry in his periodical, *The Craftsman*, in which the letters forming his *Dissertation on Parties* first appeared. In 1735, finding his political hopes clouded forever, he went back to France in chagrin, and continued there till 1742. During his second residence abroad he wrote his *Letters on the Study of History*, in which, as a Deist, he violently attacked the Christian religion. He is believed to have influenced the thought of Voltaire. He died, after a long illness, in 1751. Bolingbroke has been styled 'the Alcibiades of his time,' and was admired by his contemporaries for his graceful person and charming manners. His talents were brilliant and versatile; his style of writing was polished and eloquent, and repays study to the present day; but the lack of sincerity and honest purpose which characterized him, and the unscrupulous ambition which made him aim for power, hindered him from looking wisely and deeply into any question. His philosophical theories are not profound, nor are his conclusions solid, while his criticism of passing history is worthless. His collected writings were published by Mallet (London, 1753-54).

BIBLIOGRAPHY. Goldsmith, *Life of Lord Bolingbroke* (London, 1770); Cooke, *Memoirs of Lord Bolingbroke* (London, 1835); Brosch, *Lord Bolingbroke und die Whigs und Tories seiner Zeit* (Frankfort, 1883); Macknight, *Life of Bolingbroke* (London, 1863); Schlosser, *History of the Eighteenth Century*, Vol. III. (London, 1843-52); Stephen, *Religious Thought in the Eighteenth Century* (New York, 1876); Parke, *Bolingbroke's Letters and Correspondence* (London, 1798); Collins, *Bolingbroke: A Historical Study* (London, 1886).

BOLINTINEANU, bô-lên-tê-nê-ăn', DIMITRI (1826-72). A Rumanian poet, born at Bolintina, Wallachia. He was a member of the civil service, but lost his post through the publication of political articles and poems. Subsequently, at the time of the revolutionary outbreak against the Russian protectorate, he was proscribed and fled the country. After his return, he was appointed Minister of Public Instruction (1859). He was the representative poet of the Rumanian Renaissance. In addition to his *Rumanian Melodies* (1858) and other verse, he wrote dramas, satires, and works of fiction.

BOLIVAR'. A city and the county-seat of Polk County, Mo., 39 miles north-northwest of Springfield, Mo., on the Saint Louis and San Francisco Railroad (Map: Missouri, C 4). It has a considerable trade in apples, poultry, eggs, patent medicines, horses, and mules. The city is the seat of the Southwest Baptist College, opened in 1878. Settled about 1835, Bolivar was incorporated in 1855, and is now governed under a charter of 1881, which provides for a mayor elected biennially, and a city council. The waterworks and electric-light plant are owned and operated by the municipality. Population, in 1890, 1485; in 1900, 1869.

BOLÍVAR, bô-lē'vär. A northern department of the Republic of Colombia, bounded by the Magdalena River on the east, the Department of Antioquia on the south, Cauca on the west, and the Caribbean Sea on the west and north. It covers an area of 21,345 square miles (Map: Colombia, B 2). It has a low surface, mostly still overgrown with thick forests and very little cultivated. Its chief rivers are the Magdalena with its tributary, the Cauca, and the Sinú, all navigable. The climate is hot and extremely unhealthy. Population, about 300,000. Capital, Cartagena (q.v.).

BOLÍVAR. The largest State of Venezuela, bounded by the Orinoco on the north, Colombia on the west, the territory of Alto Orinoco and Brazil on the south, and the territory of Yuruary on the east (Map: Venezuela, E 2). It covers an area of 88,700 square miles and has a population exceeding 50,000. Capital, Ciudad Bolívar (q.v.).

BOLIVAR. See RIOBAMBA.

BOLÍVAR, *Sp. pron.* bô-lē'vär, SIMON, or **BOLIVAR Y PONTE** (1783-1830). A South American patriot, called the Liberator. He was born in Caracas, July 25, 1783, of a noble and wealthy family. After studying law in Madrid, he traveled extensively on the Continent, married, and returned to his native country, where his

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wife died. He then revisited Europe, and in 1809 returned by way of the United States, where he became an enthusiastic admirer of republican institutions, and resolved to free his own country from foreign despotism. Arriving at Venezuela, he at once associated himself with a secret organization of the patriots there; and after the insurrection of Caracas, April 19, 1810, he was sent to London to gain the interest of the British Cabinet. The British Government, however, declared its neutrality, and Bolivar speedily returned. He fought under General Miranda in several successful engagements. In 1812 the Spaniards recovered possession of Venezuela, and Bolivar fled to Curaçao. He did not, however, remain long inactive, but won the sympathy of the republican President of New Granada, raised a force of volunteers, defeated the Spaniards several times, his army increasing with each victory; and on August 4, 1813, entered Caracas as a conqueror. He was hailed as the liberator of Venezuela, and made absolute dictator in civil and military affairs. After defeating the Spaniards in several engagements, he was himself beaten in the battles of La Puerta and Aragua. He now went to Cartagena, and afterwards to Kingston, in Jamaica. In Haiti he assembled the insurgent refugees, landed (December, 1816) on the island of Margarita, where he convoked a congress, instituted a government, and proclaimed the abolition of slavery. The following two years were marked by successes over the Spanish general, Morillo. In February, 1819, a congress was opened at Angostura, and Bolivar, chosen President, was armed with the power of dictator. He conducted his forces over the almost impassable Cordilleras to New Granada, and achieved the victories of Tunja and Sojaca. Soon afterwards (in 1819) New Granada united with Venezuela as the Republic of Colombia, of which he became the first President. By 1822 the new republic was completely cleared of Royalist troops. Bolivar was summoned the same year to help the Peruvians, and in February, 1824, was named Dictator of Peru. By 1825 the Spaniards were driven from Peru also; and Bolivar, calling a congress at Lima, formally resigned the dictatorship. The southern part of the country was erected into a separate State and named Bolivia (q.v.), of which he was chosen President for life. A form of government suggested by him was adopted by Bolivia in 1826. Widespread dissatisfaction in Colombia, where, in spite of considerable opposition, he was confirmed in the presidency in 1826 and 1828, led to a conspiracy against his life, which was suppressed by the execution of the leaders and banishment of 70 accomplices. In 1829 Venezuela separated itself from the Republic of Colombia, which was generally disturbed by factions. Bolivar's ambition was loudly denounced, and, virtually forced to resign, he retired to Cartagena. He died at San Pedro, December 10, 1830, having shortly before his death written a farewell address to the people of Colombia, in which he vindicated his character from the aspersions that had been cast on it, and complained bitterly of ingratitude. The war of liberation and the peculiar elements with which he had to deal, compelled him to assume dictatorial power; but there is no proof that he was ever insincere in his devotion to liberty. His property was mainly devoted to the services of his country. He has been described as the Washington of South America. By a resolution of the Congress of Colombia in 1842, his ashes were removed with great pomp from Santa Maria to Caracas. A statue of Bolivar was erected in Central Park, New York, 1884. The official documents connected with the career of Bolivar were published by the Government at Caracas in 1826, and his correspondence, in two volumes, at New York in 1865. Consult Ducoudrey-Holstein, *Mémoires de S. Bolivar* (London, 1830).

BOLIVAR (bô-lē'vär) **CITY.** See CIUDAD BOLIVAR.

BOLIV'IA, *Sp. pron.* bô-lē'vyà (in honor of Simon Bolivar). An inland South American republic, situated in the western part of the continent, and extending from about latitude 8° S. to 22° 50′ S., and from longitude 58° W. to 73° 20′ W It is bounded by Brazil on the north and east, by Paraguay and Argentina on the south, and by Chile and Peru on the west. Its area, excluding the disputed territory of El Chaco Gran (q.v.) and the Littoral Department held by Chile since the War of 1879-80, is estimated to be about 515,000 square miles.

TOPOGRAPHY. Bolivia is one of the highest regions in America. In a general way it resembles Colombia, in that its western part belongs to the region of the Andes (q.v.), while the eastern part is occupied by extensive plains, or llanos. Two parallel chains of the Andes traverse the country from northwest to southeast, with several minor ranges branching toward the east. The eastern chain, or Cordillera Real, contains some of the highest peaks of the two American continents: Illampul, or the Nevado de Sorata, and the Illimani, both over 21,000 feet high; Todos Santos, 19,500 feet; Chorolque, 18,500 feet; and the Cerro de Potosí, 15,500 feet. In the western range the peaks are generally much less lofty, but they include the giant volcano Sajama, estimated to be nearly 21,000 feet in height. Between the two ranges lies the region known as the Bolivian Highlands, or *Altiplanicie*, a plateau with an elevation of 12,000 to 13,000 feet. It is traversed by a number of small chains, and contains a portion of Lake Titicaca (q.v.), which lies at an elevation of 12,500 feet, and is believed to be a remnant of an inland sea. The mountain chains of Bolivia include many volcanoes, some of which are active at the present time. Cretaceous formations are found in the western range, while in the Cordillera Real Paleozoic rocks seem to predominate; but the geology of the region is only imperfectly known. The portion of the country east of the Andes, known as the Montaña, is occupied by an extensive plain, which is traversed by numerous navigable rivers, and covered with dense forests. The surface is generally level, and its decline from about 3000 feet near the Andes to about 300 feet at the eastern boundary is so gradual as to be almost imperceptible. The chief rivers of the country flow through this section, which belongs to the basins of the Paraguay and the Madeira. The former, which forms part of the boundary with Brazil, is reached through the Pilcomayo and the Bermejo, both watering the southern part of the country, while the Madeira takes in the larger portion of Bolivia through the navigable rivers Beni, Itenez, and Mamoré, with their numerous tributaries. Steamboat navigation has been established on some of these waters. In the region of the Boliv-

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ian Highlands there are only a few insignificant streams, such as the Desaguadero, which connects the lakes of Titicaca and Aullagas, the latter also connected by a short river with the salt lake of Coipasa.

CLIMATE. In regard to climate, Bolivia may be divided into three regions: the eastern llanos, or *tierras calientes*, where the climate is hot and damp; the highland region, or *tierras templadas*, with a more or less temperate climate; and the mountain regions, or *tierras frias*, where the climate is comparatively cold. At La Paz, situated at an altitude of nearly 12,500 feet, the temperature ranges from 44° to 73°, with an average of about 50°. The coldest months are June, July, and August, when the temperature is marked by extreme fluctuations. During December, January, and February, which constitute the wet season, rains and hail-storms are frequent, and the rivers are subject to overflow. In the eastern plains the wet season lasts from November to April, but rains occur also during other parts of the year, and inundations are frequent. This portion of the country is the most unhealthful, owing to the exhalations from partly submerged plains and the poor circulation of the air. The most salubrious and temperate climate prevails in the region of the Medio Yunga, which embraces all the territory lying between 5000 and 9000 feet. For Europeans the climate is rather trying. Dysentery is the usual affliction of newcomers, and fevers and smallpox are not infrequent, even among the natives.

FLORA. The flora of Bolivia is most luxuriant in the region below 6500 feet, where the vegetation is essentially tropical, and where the coffee, cacao, pineapples, bananas, cotton, sugar-cane, rice, cinnamon, and vanilla, besides numerous medicinal plants, such as cinchona, sarsaparilla, etc., are cultivated. The forests, which are especially abundant in this region, are composed largely of ebony, mahogany, rosewood, cedar, wax, cork, rubber, and numerous species of palm. The temperate zone includes all the territory lying between 6500 and 12,000 feet, and embraces the southeastern and a portion of the western departments. Here are found lemons, grapes, figs, peaches, and other European and southern fruits and vegetables, as well as the common cereals, wheat, corn, barley, etc. In the frigid zone, or Puna, which comprises, in the territory lying above 12,000 feet, the mountains of the Andes and the high table-land around Lake Titicaca, the Bolivian Highlands, trees are entirely wanting, and the cereals are cultivated only in the more favored regions. It affords, however, extensive grazing-lands, and is inhabited chiefly by Indians engaged in pastoral pursuits.

FAUNA. The fauna of Bolivia is also characterized by great variety, but the difference between the zones is not so well marked as in the case of the flora. The jaguar, puma, tapir, armadillo, several varieties of monkeys, alligators, and many other South American species are well represented. In the higher regions are found the vicuña, guanaco, and llama. Birds also are numerous, and include a variety of parrots, pigeons, toucans, chatterers, and humming-birds, a few of which fly to altitudes above 14,000 feet.

AGRICULTURE, MINERAL PRODUCTION, AND INDUSTRY. Agriculture, notwithstanding the favorable natural conditions, is utterly neglected. The land, though held partly by whites, is cultivated chiefly by the Indians. The methods employed are extremely primitive, most of the work being done by hand. The chief importance of Bolivia lies in its vast mineral resources. The profusion of gold decoration found in the royal palaces and temples of the Incas at the Spanish Conquest, as well as the numerous instruments belonging to the period preceding that event which are found in the mines worked at present, indicate that the gold deposits of Bolivia were exploited by the Incas. After the Spanish Conquest the natives discontinued the mining of the metal, which was the chief cause of their downfall, and the work was subsequently taken up by the conquerors. The most important centre of gold-mining was the Tipuani River, in the Andes not far from La Paz. After Bolivia became independent gold-mining began to decline, and at present very few mines are worked by modern methods. Gold is supposed to exist in all the mountain streams of the northwestern as well as the southwestern parts of the country. At present silver, in the amount produced, ranks first among the minerals of Bolivia. This metal is worked chiefly in the Province of Potosí, though it is believed that deposits exist in many other parts of the Bolivian Andes. The total production of silver, as reported by the chief mining companies, averages annually over 10,000,000 troy ounces. Tin is next in importance to silver. The tin-mines are situated principally in the departments of Oruro, Potosí, La Paz, and Cochabamba, at an altitude of 14,000 feet, the most productive being in the departments of Oruro and Potosí. The output of tin has increased very rapidly, the methods employed being comparatively modern, and amounts at present to about 40,000 tons yearly. Rich copper deposits are located in the mountains near the Desaguadero River, in the Department of La Paz. The average annual production of copper aggregates about 2000 tons. There are also deposits of bismuth, antimony, borax, salt, lead, zinc, etc. In Bolivia, as in other South American countries, inadequate transportation facilities and the lack of modern machinery—obstacles removable only by the aid of foreign capital—are factors which militate against the development possible to the valuable mineral resources. That the Government is fully conscious of this fact is evidenced by its liberality in the granting of concessions and in the matter of appropriations for the surveying of new railroad lines. Manufacturing industries are practically of no importance.

COMMERCE, TRANSPORTATION, ETC. Bolivia is greatly hampered in the development of commercial interests by its inland situation. It exports chiefly metals, rubber, wool, hides and skins, and other raw products, the trade being carried on principally through the Chilean ports of Antofagasta, and Arica, the Peruvian port of Mollendo, and the river ports of Villa Bella and Puerto Suarez, on the eastern frontier. Estimates for the commerce of Bolivia since 1895 place the average annual imports at nearly 13,000,000 bolivianos ($6,000,000), and the exports at about 24,000,000 bolivianos ($11,000,000). The import trade is to a great extent controlled by Germany, which exports to Bolivia woolens and silks, machinery, furniture, and clothing. France controls the imports of wine, owing to the treaty by which French wines have been admitted free of duty.

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The trade with the United States, which shows some increase of late, is confined mainly to imports of cotton fabrics. The leading position of Germany in the commerce of Bolivia is attributed largely to the predominance of German immigration and to the cheaper prices of German goods.

The surface formation of the country is not favorable to the development of a good system of communication. Most of the roads in the mountainous regions are intended only for pack-animals, by which the internal commerce is principally carried on, and wagon-roads are found only in the vicinity of the capitals of the provinces and other large cities. The principal roads of the country in 1900 had a total length of nearly 950 miles. Of railways Bolivia has only one narrow-gauge line from Oruro to the Chilean frontier (about 500 miles), with a small branch line (25 miles) to the mines of Huanchaca. Plans for new lines, however, are numerous, and concessions have been granted for railways to connect the city of La Paz with the Peruvian frontier, Oruro with Cochabamba, and Santa Cruz with Bahía Negra, on the eastern frontier. Bolivia is connected by telegraph-lines with Peru, Chile, and Argentina, and by cable with the United States and Europe. There are about 2300 miles of telegraph-lines.

GOVERNMENT, FINANCE, ETC. The government of Bolivia is a representative democracy, in which the executive power is vested in a President, elected directly for four years, who is assisted by two Vice-Presidents, similarly elected, and a responsible Ministry of five members. Neither the President nor the Vice-Presidents are eligible for two successive terms. The legislative authority is intrusted to a Congress consisting of a Senate of 18 members, elected for six years, and a Chamber of Deputies of 64 members, elected for four years. For administrative purposes Bolivia is divided into eight departments, which are subdivided into provinces and cantons. The governors of the departments and the prefects of provinces are appointed by the President, and they, in turn, appoint the administrative officers of the cantons. The two territories in the northwestern part of the country have been administered since 1900 by separate officials called 'delegados nacionales.' Municipalities in each department are subject to supervision by the municipal council of the capital of the department. The Supreme Court, which constitutes the highest judicial authority of the republic, consists of judges nominated by the Senate and elected by the Chamber of Deputies. The republic has seven judicial districts, each containing a number of superior courts and inferior tribunals. Since 1892 military service has been compulsory for every able-bodied citizen between the ages of 21 and 50 years. The total strength of the Bolivian Army is over 80,000 men, of whom only about 2600 belong to the standing army, the remainder being composed of reserves and territorial guards. The revenue is derived chiefly from import and export duties, and internal revenue. The annual budget balances at nearly 10,000,000 bolivianos ($4,500,000). The external debt of 6,550,000 bolivianos ($2,700,000), dating from the Chilean War, has been nearly paid. The internal debt amounted in 1900 to about $1,500,000.

EDUCATION. Theoretically, education is free and obligatory; but the number of public schools is very inadequate for the needs of the country. There are six universities, eight colleges, five theological seminaries, and a number of private high schools. The primary schools, mostly maintained by the municipalities, number some 700, with a total attendance of about 37,000. There are also a number of missionary schools for the natives.

POPULATION. No census has been taken in Bolivia since 1854, when the population was 2,326,126, of whom the whites and mestizos numbered only 634,000. The population has practically remained stationary since then, now being estimated at 2,500,000, including whites, mainly of Spanish origin, mestizos, and Indians. The last belong mostly to the Aymará and Quichua tribes, which have been partly converted to Christianity and are engaged in agricultural pursuits. In the eastern portion of the country are found a number of Indians of the Guarani tribe, who are still uncivilized. The capital of Bolivia and largest city is La Paz.

HISTORY. The territory of Bolivia, which was subdued by Hernando Pizarro in 1538, constituted, under the name of the Audiencia of Charcas, a part of the Viceroyalty of Peru till 1776, when it was annexed to the Government of La Plata. Within forty years after the Conquest, Spanish settlements were formed at Chuquisaca (Sucre), Potosí, La Paz, and Cochabamba, and numerous silver-mines were opened, in which the Indian population was compelled to labor. So thoroughly were the natives subjugated that no important rising occurred till 1780, when Tupac Amaru, a descendant of the ancient Incas, headed a formidable insurrection, which for a time threatened the destruction of the Spanish power in the region. The first revolutionary outbreak against the authority of Spain occurred at Chuquisaca (Sucre) in May, 1809, and was followed in August by a rising of the inhabitants of La Paz. In 1810 an army from Buenos Ayres came to the assistance of the patriots, but it was defeated at Huaqui by General Goyoneche, who put down the insurrection with great cruelty. For fifteen years the country was devastated by a sanguinary guerrilla warfare, with several pitched battles, in which victory changed from side to side. More than once fresh Argentinian armies invaded Upper Peru, but no definite result was attained till 1824, when the Spanish army in Peru was crushed by the Colombian force under General Sucre. On August 6, 1825, a Congress at Chuquisaca declared the independence of Upper Peru, and five days later the Republic of Bolivia was organized, embracing the provinces of Potosí, La Paz, Cochabamba, and Santa Cruz. A constitution drafted by Bolivar, the Código Boliviano, was adopted, and the Presidency for life was offered to General Sucre, who accepted the office for two years only. From the beginning, almost, of its national existence, Bolivia was plunged into a state of chronic revolution and civil war, from which it was relieved only at intervals by the absolute rule of some military leader. Access to the office of President was gained most often through force of arms, and in the struggle between factions the Constitution of the country was repeatedly tampered with, suspended, or totally disregarded. Of those Presidents who succeeded in giving Bolivia breathing-space for the development of its resources, mention may be

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made of Santa Cruz (1829-39), who in 1836 usurped the chief power in Peru and constituted it, together with Bolivia, a federal republic under himself as protector; Generals Belzu and Córdova, who were in power from 1848 to 1857, and José Maria de Acha (1861-64), in whose time treaties were concluded with the United States and Belgium, and some attempts made to foster the foreign trade of the country. By arrangements made in 1866 and 1874, the joint possession of Chile and Bolivia had been established over the rich nitrate-fields of the desert coast of Atacama; but strife between the two could not be avoided, and in 1876 Chile declared war against Bolivia and its ally, Peru. The brunt of the fighting fell on the latter power. The leading ship of the Peruvian fleet was captured, the land forces of the allied republics were overthrown, the Bolivian port of Antofagasta was seized, and by the treaty of November 29, 1884, Bolivia gave its assent to the retention by Chile of its seaboard with the rich mineral-fields—a loss which proved a serious blow to the prosperity of the country. From 1884 to 1898 there was internal peace; but in the autumn of 1898 a military revolution broke out, which after a half-year's fighting resulted in the overthrow of President Severo Fernando Alonzo and the elevation of José Manuel Pando to the Presidency.

BIBLIOGRAPHY. Cisneros and Garcia, *Geografica comercial de la América del Sud* (Lima, 1898); Ballivián and Zarco, *Monografías de la Industria Minera* (La Paz, 1895); Child, *The Spanish-American Republics* (New York, 1894); Ford, *Tropical America* (London, 1893); Markham, *The War Between Peru and Chile* (London, 1882); Wiener, *Pérou et Bolivie* (Paris, 1880); *Archivo Boliviano-Colección de documentos relativos de la historia de Bolivia.*

BOLKHOV, bôl-kôf'. The capital of a district in the Government of Orel, Russia, about 36 miles north of the city of Orel, and 200 miles from Moscow. Bolkhov is situated on the steep banks of the Nugra, which empties into the Oka about 10 miles northeast of the town. Bolkhov proper is on the left bank, and on the right is the Zaretsky suburb. It is an active, thriving town, trading to the amount of 1,500,000 rubles ($750,000) annually, in hemp, grain, tallow, rapeseed oil, etc. It has several mills and factories; the annual produce of its tanneries is estimated at 530,000 rubles ($270,000). A peculiar feature of the town is the location of its harbor, which is 12 miles distant in the village of Krutogorye, on the Oka River. Population, in 1897, 20,700.

BOL'LAN, WILLIAM (? -1776). An English-American lawyer and writer, born in England. He emigrated to Massachusetts about 1740, married a daughter of Governor Shirley, and through this connection obtained an appointment to the position of Advocate-General. As the agent of Massachusetts in England (1745-48), he secured from the British Government the repayment of the money advanced by that colony to defray the expenses of the Cape Breton Expedition. In 1769 he obtained and sent to Massachusetts a collection of letters written by Governor Bernard and General Gage, strongly criticising and abusing the colonists. On the approach of the Revolutionary War, he strove to effect a conciliation between the British Ministry and the American Colonies. Among the numerous pamphlets written by him are: *The Ancient Right of the English Nation to the American Fishery Examined and Stated* (1764); *The Mutual Interests of Great Britain and the American Colonies Considered* (1765); *Freedom of Speech and Writing Upon Public Affairs Considered* (1766); *A Free Britain's Memorial in Defense of the Right of Election* (1769); and *A Petition to the King, with Illustrations Intended to Promote the Harmony of Great Britain and Her Colonies* (1774).

BOL'LANDISTS. An association or succession of Jesuits by whom the *Acta Sanctorum* (q.v.) are collected and published. They derive their name from their head, Jean Bolland, who was born at Tirlemont, Belgium, August 13, 1596, joined the Jesuits in 1612, and was called to Antwerp in 1630 to edit and publish the materials for the lives of the saints which had been collected by the Jesuit Heribert Rosweyd, who had died the year before. Bolland chose as his collaborators Godfried Henschen and Daniel van Papenbroeck. The days of the saints, usually their days of death, were arranged chronologically, and so the lives follow this order, and several volumes are given to one month. The first volume appeared in 1643. Bolland died in Antwerp, September 12, 1665. The work was carried on by those associated with the original company. Some of them are: C. Janning (died 1723), P. Bosch (died 1736), C. Suysken (died 1771), I. Hubens (died 1782), A Berthod (died 1788), and J. Ghesquière (died 1802). In 1773 the Jesuit order was suspended, and in 1775 the convent in which the Bollandists had lived was turned into a military school. It seemed as if their task must be abandoned; but in 1776 the Empress Maria Theresa came to their assistance, and secured for them the Caudenberg Monastery, in Brussels, and also for each Bollandist a modest pension. Her successor, the Emperor Joseph II., ordered that they should produce a volume yearly, and as it was impossible for them to do so, expressed such great dissatisfaction that in 1788 he forbade them to bring out another volume. In 1789 their library and all their materials were sold to the Premonstatensian Abbey of Tengerloo, not far from Antwerp, for 25,000 francs, and there the work was continued for a time. But in 1796, the French having invaded the country, the abbey was dissolved. The materials were not scattered, however. In 1825 they were removed to Brussels. In 1836 it was reported in Brussels that the work was to be continued in Paris. This so stirred the interest of the Belgians that the Government passed a yearly subsidy of 6000 francs to insure the continuance of the work on Belgian soil; a new company of Bollandists was formed, and ever since the volumes have been coming out.

In 1882 a supplement to the volumes already published, and preparatory studies for those not yet in press, began to appear under the title *Analecta Bollandiana.* The principal collaborators on this series are de Smedt, van Hooff, and de Backer.

BOLLES, bōlz, ALBERT S. (1846—). An American lawyer, educator, and author. He was born in Montville, Ky. He studied law and was admitted to the Connecticut bar, and in 1870 was elected judge of the Probate Court. He afterwards edited successively the Norwich *Bulletin* and the *Bankers' Bulletin*, and for several years

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was professor of mercantile law and banking in the University of Pennsylvania. He was then, for eight years, chief of the Pennsylvania Bureau of Industrial Statistics, and subsequently became lecturer at the University of Pennsylvania and at Haverford College. Among his publications are: *Financial History of the United States from 1774 to 1789* (1879); *Financial History of the United States from 1789 to 1860* (1883); *Financial History of the United States from 1860 to 1885* (1886); *Practical Banking* (1884); *Industrial History of the United States* (1878); *The Conflict Between Labor and Capital* (1876); *The History of Pennsylvania* (1899); and *American Finance* (1901).

BOLLES, Frank (1856-94). An American author, born in Massachusetts. He received his law education in Washington, D. C., and at Harvard; gave himself up to literary work, became an editor of the Boston *Advertiser*, and finally secretary to Harvard University, where he labored successfully to aid poor students. He was also conspicuous as a writer of nature studies, somewhat in the manner of Thoreau. In prose he produced the following works: *The Land of the Lingering Snow* (1891); *At the North of Bear Camp Water* (1893); *From Blomidon to Smoky* (1894); and, in verse, *Chocurua Tenants* (1898).

BOLLWORM bōl'wûrm (*boll*, the round pod or capsule of cotton + *worm*). The widely destructive caterpillar of a nocturnal moth (*Heliothis armigera*). "Of popular names," says C. V. Riley, who studied and wrote extensively upon it, "it has one for almost every plant upon which it feeds and for every country which it inhabits, and as it is almost cosmopolitan and a very general feeder, these names are many. Throughout cotton-growing States it is very generally known as the 'bollworm' when it occurs upon cotton; when it occurs upon corn it is called the 'cornworm' or 'earworm.' . . . In many Southern States it is known in the early part of the season as the 'cornbud-worm.' When found upon tomatoes it is the 'tomato-worm.'" It attacks a great variety of vegetables and flowers (gladiolus, etc.), and in Europe feeds upon maize, hemp, tobacco, lucerne, etc. It usually produces two to five broods in a season, and ranks among the most destructive and difficult to combat of all injurious insects. The moth has an expanse of about 1¾ inches; the general color of the upper surface varies from light greenish-gray to a rich yellow-gray, almost tawny, and the markings vary much in intensity and size. The moths fly in the evening dusk, seeking the flowers of some suitable plant of the season, and depositing their eggs upon the surface of, or more often near to, the flower-bud. When Indian corn is about to flower this plant seems preferred to anything else (save perhaps cotton) then available; and tomatoes with corn near them will be saved to a great extent by this preference. The egg hatches soon, and the young caterpillar begins to feed and to make its way steadily toward flower-bud or boll, searching patiently for it until found, when it begins at once to feed there, destroying the essential parts of the unfolded flower of corn or other plant, or ruining the cotton-boll, whether more or less advanced. "As the bollworms increase in size, a most wonderful diversity of color and marking becomes apparent. In color, different individuals will vary from a brilliant green to a deep pink or a dark brown, exhibiting almost every conceivable intermediate stage, and from an immaculate, unstriped specimen to one with regular spots and many stripes." In addition to their feeding upon this vegetable matter, these caterpillars are carnivorous, seizing and devouring each other whenever opportunity offers, and invariably doing so when shut up together in a breeding-cage or traveling-cage, until only one remains. At the end of about three weeks the worms drop to the ground, work their way several inches into the soil, and, spinning a mantle of silk about them, become reddish-brown polished pupæ. In the warmer parts of the United States no less than five broods appear. It is the third or July brood which does most harm to the corn, and the fourth (August) brood that furnishes the bollworm proper and the greatest destruction to cotton, while 'budworms' are those of the spring hatching. The fifth brood winters as chrysalis and maintains the race.

Bibliography. C. V. Riley, *Third Report Insects of Missouri; Annual Reports United States Department Agriculture* (Washington, 1881); *Fourth Report United States Entomological Commission* (Washington, 1885); Lintner, *First Report Insects of New York* (Albany, 1883); Malley, *Bulletin No. 24, United States Department Agriculture* (Washington, 1891).

BOLOGNA, bō-lōⁿ'nyä (anciently, Lat. *Bononia*). A city of Italy, in Romagna, capital of the Province of Bologna, situated in a fertile plain at the foot of the Apennines, where the ancient Via Æmilia intersected the Reno (Map: Italy, F 3). Industrially Bologna is of great importance. The products for which the city is especially famous are macaroni, Bologna sausages, liquors, and canned fruit. There are also large manufactures of silk, linen, glass, leather, and machinery. The commerce is considerable, and is greatly facilitated by excellent railway connections. Bologna is the seat of a court of appeals and of an archbishop. It has a large garrison. The population of the city, including the suburbs, was 123,274 in 1881 and 152,009 in 1901.

The city was called in the early Middle Ages *La Dotta*, 'the Learned,' on account of its great university; or *La Libera*, from its democratic constitution; and later *La Grassa*, for the fertility of its soil and its wealth.

Architectural Features. The town has not been generally rebuilt, and its narrow, irregular streets, numerous towers, and old palaces give it a mediæval aspect. In both the new and old quarters the façades of most of the houses overhang the second story, being supported on vaulted arcades. These arcades extend for miles in every direction, forming open galleries, protected from the weather, where all the shops are situated—an arrangement which never has been so thoroughly carried out in any other city. Many of these arcades date from the Thirteenth to the Sixteenth Century, when the city was most flourishing, and illustrate both Gothic and Renaissance civil architecture in brick and terra-cotta. The finest are the portico of the Banchi (Sixteenth Century), under buildings by Vignola, and the portico of the Servi, built in 1312 by Manfredi. The later colossal portico of the Scalzi is 1700 feet long, with 167 arches. The longest of all the arcades are those leading from the city to the pilgrimage Church of the Ma-

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donna di San Luca, with 635 arches; the distance is about a mile and a half (1676-1739).

The city is also remarkable for its churches, of which there are about 130, dating in unbroken succession from the Eleventh Century to the present. The earliest are the group of seven churches called San Stefano, unique in Italy, and dating from the Eleventh and the Twelfth centuries, and examples of simple Lombard brick architecture. This group includes a small basilica of Saints Pietro and Paolo, with early groin vaulting, originally the cathedral; the circular, vaulted Church of San Sepolcro, built in imitation of the Holy Sepulchre (Twelfth Century); a well-preserved cloister, remarkable for its second-story arcades, usually destroyed in mediæval cloisters; an interesting subterranean church, and several other small churches and chapels, with monastic buildings, the whole being connected by numerous passages. Remains of contemporary fortified feudal palaces are numerous, the most imposing being the leaning tower of the Asinelli family, built in 1109, and 320 feet high, and that of the Garisendi family, of 1110, 163 feet high. The latter is 10 feet out of the perpendicular and is mentioned by Dante (*Inferno*, xxxi. 136), who compared it to the giant Antæus. Bologna had 180 such towers in the Middle Ages.

There are also many quaint houses of the Thirteenth Century, combining wood and brick, and from this period date the two great palaces of the ancient republic, the Palazzo del Podestà, famous as the place where King Enzio, son of Emperor Frederick II., was imprisoned, and the Palazzo Pubblico, for the general popular assemblies; as well as such large private houses as and Palazzo Pepoli, with its great court; the Palazzo Malvasia, and the Loggia dei Mercanti, all of Gothic architecture. Bologna was then one of the foremost of the free communes. It was at the same time one of the important centres of the great religious revival emphasized by the two mendicant and preaching Orders of Saint Francis and Saint Dominic. The churches of San Domenico and San Francesco were among the first erected by these orders (c.1220-30), and among the earliest examples of Gothic architecture in Italy—earlier than their rivals in Venice and Florence. Other Gothic churches are the Madonna dei Servi, and, above all, the colossal church of the national patron, San Petronio, designed in 1390 to be the largest cathedral in Italy. It was never completed as planned, only the nave and aisles being built (337 × 171 feet), without the transept with its central dome, or the apse, which would have made a structure surpassing the Cathedral of Florence in size. The proportions of the details are on so large a scale, with only twelve piers to support the arches and vaulting, that the real size is not apparent. The Gothic tracery of the large windows is the finest in Italy, and the sculptures on the façade doorways, by Jacopo della Quercia, are among the most interesting works of the earliest Renaissance. The finest work of Gothic sculpture in the city is the shrine of San Domenico (1267), by Giovanni Agnelli, from the designs of Niccola Pisano. The churches are full of interesting Gothic sepulchral monuments of the old university professors, with reliefs representing them teaching their classes, while other monuments stand in the streets under stone canopies, and represent men of political note, in the same style as that which prevailed in Padua, Verona, etc.

It is probable that most of the best mediæval works of art in Bologna were by artists from other cities; for Bologna was not creative artistically until the late Renaissance, but was given over to the pursuit of wealth. It was original, however, in its arcades and in its use of terra-cotta decorations of brick constructions. It was late in adopting the Renaissance, and then (c.1500) it used terra-cotta work most effectively in the new style. It is one of the most remarkable cities in Italy for its fine Renaissance palaces. Such are the Palazzi Fava, Bolognini, Malvezzi, Bevilacqua, and Bentivoglio, and the later part of the Palazzo del Podestà. More classic and later Renaissance buildings are the Malvezzi Medici Palace, and the old University (now library), by Terribiglia. San Giacomo Maggiore and San Michele in Bosco are examples of the Renaissance, and San Pietro of the Barocco style of church. In civil Barocco architecture, Tibaldi distinguished himself in the Magnani Palace and the present University building (1577).

History. According to legend, Bologna was founded about the Eighth Century B.C. by a colony of Etruscans. It was then called Felsina. Several necropolises, especially that called Villanova, have yielded testimony to this early occupation. Many of the objects found in the tombs are of archæological interest. They are exhibited at the Museo Civico. Felsina was long the most important Etruscan city north of the Apennines, and the earliest stage of Italian culture is called the Villanova Age. It was conquered by the Gallic tribe of the Boii and called by them Bononia, the name it has since retained. Having espoused the cause of Hannibal, it was conquered by the Romans, who made it a colony in B.C. 189. It remained a city of great importance under the Empire. After the fall of the Western Empire, Bologna was annexed, with its territory, to the Exarchate of Ravenna. It passed to the Lombards on the fall of the Byzantine Exarchate, but was soon made a free city by Charlemagne. The Imperial charter of 1112 recognized its right to elect its own magistrates, and from that time the city became noted for its strongly organized guilds and its thorough democratic spirit, which went so far as to exclude the nobility from office, as in Tuscany. Bologna acquired world-wide fame during the Middle Ages through its university, one of the oldest in the world. Under Imperial protection it became the greatest centre of learning in Italy, and the expounder of Roman law. It reëstablished the text of the *Corpus juris civilis*. During the Twelfth and Thirteenth centuries, when it was especially flourishing, there were in attendance ordinarily anywhere from 3000 to 10,000 students from all parts of Europe. The faculties of medicine and theology were added later to that of law. There have been a number of women among its professors. Of the earliest the most famous was Novella d'Andrea, in the Fourteenth Century, and of the latest, Clotilda Tambroni. It was the pioneer in the study of anatomy (Fourteenth Century), and Galvani here discovered galvanism. The celebrated linguist Mezzofanti also taught here, and such men as Aldrovandi, Marsili, Lanza, Alessandrini, Basse. Its library now contains over 170,000 volumes and many important manuscripts.

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There are at present about 1500 students. The Archæological Museum is one of the most important in the country. It is rich in treasures from the Etruscan Period, and in medals, illuminations, and sculptures of the Renaissance. The Academy of Fine Arts contains Raphael's famous "Saint Cecilia"; otherwise it is chiefly remarkable as illustrating the local Bolognese School, not only the earlier men, like Francia, but especially the school of the Caracci (q.v). Bologna possesses also one masterpiece of Barocco sculpture in the colossal statue of Neptune by Giovanni Bologna on the Giant's Fountain. Earlier sculptures of considerable merit are scattered through the churches.

The political history of Bologna after the adoption, in the Twelfth Century, of its democratic communal institutions shows at first a predominance of the Imperial or Ghibelline Party; but after a long and sanguinary contest between democratic Guelfs and aristocratic Ghibellines the former triumphed. The city then fell into the arms of the Papacy. Direct Papal rule was imposed by Cardinal Albornoz and Julius II., resulting in the loss of the city's liberties and the decline of its prosperity (1506). Here Leo X. and Francis I. met in 1515; here Charles V. was crowned in 1530 by Clement VII. Bologna remained a part of the Papal territory until 1796, when it was taken by the French troops under Augereau and made by Napoleon the capital of the Cispadane Republic. It reverted to the Papal States in 1815, but became a hotbed of revolutionary and national movements, such as those of 1831 and 1849. In the latter year it was taken by the Austrians, who held it until the war of 1859, when the defeat of that power by France and Sardinia made an Italian kingdom possible. The Bolognese, by an overwhelming vote (1860), decided for annexation to the dominions of Victor Emmanuel.

Consult: Muzzi, *Compendio della storia di Bologna* (Bologna, 1875); Ricci, *Guida di Bologna* (Bologna, 1882); Burton, *Etruscan Bologna* (London, 1876); Taine, *Italy* (New York, 1877); Hare, *Cities of Italy* (London, 1884); Tuckerman, *Italian Sketches* (New York, 1891).

BOLOGNA, Giovanni, called by the French Jean Boulogne (1524 or 1530-1608). A Flemish sculptor. He was born in Douai, but is numbered with the Italian sculptors of the Renaissance. He was educated in Florence, and the works that represent him in Bologna and other cities are classic in subject and boldly conceived, but treated with great poetic feeling. His "Flying Mercury," delicately poised and graceful, is in the Bargello Palace in Florence; its numerous copies in museums and private collections are familiar to all. A "Fountain of Neptune," in Bologna, a bronze "Venus," in Petraja, and "Hercules and the Centaur" are among his works. Especial interest is attached to his equestrian statue of Duke Ferdinand in Florence, because it inspired Browning's beautiful poem of "The Statue and the Bust." Consult: A. G. Radcliffe, *Schools and Masters of Sculpture* (New York, 1894); J. A. Symonds, *The Renaissance in Italy* (New York, 1885.)

BOLOGNA, University of. One of the oldest and most famous universities in the world, though Paris, if not older, rivals it in antiquity, and Salerno had a school of medicine at a very early date. The origin of all these foundations is obscure. A school of law existed in Bologna in the Eleventh Century, and out of this the university grew, although the faculties of medicine and of the liberal arts did not come into prominence before the Fourteenth Century. Irnerius, the famous teacher of the Civil Law, brought great renown to Bologna in the early half of the Twelfth Century. This renown was augmented by the subsequent publication of the great Decretum or Digest of the Canon Law, compiled by Gratian, one of the doctors of the university. For the first time the Church now had its body of laws comparable with those of the State, and the *Corpus Juris Canonici* took its place by the side of the *Corpus Juris Civilis*, and both these epoch-making works are among the glories of the University of Bologna. Favored in its earlier years by the Emperors for its knowledge of the Civil Law, which was of great value to the Empire, it was favored by the Popes, in later times, for the service rendered to the Papacy by the Digest of the Canon Law. In 1360 Innocent VI. established here a school of theology. The University profited not less by private than by public benefactions, and rose to remarkable prosperity in the later Middle Ages. The number of students is said to have been about 10,000. Its organization was probably a guild of students or scholars as opposed to the other mediæval form, a guild of masters, such as prevailed in Paris. As early as 1158 these received a charter of privileges from Frederick I. known as the *Authentica Habita*. The students were divided according to nationalities, and these were again subdivided. At first, as elsewhere, four nations seem to have existed: but later, after much subdivision, two great organizations emerge—the Citramontani or Italians and the Ultramontani or foreigners—each with its own officers and administration. One of the notable features of the later history of Bologna was its admission of women as both students and instructors, among the latter being Novella d'Andrea, Laura Bassi, Mme. Mazzolini, and Clotilda Tambroni. The study of anatomy has been here promoted by many illustrious teachers—Vesalius among the number; and it was here that Luigi Galvani made the famous discovery which perpetuates his name. At present Bologna has about 1500 students, and comprises faculties of Philosophy and Letters, Mathematics and Science, Jurisprudence, Medicine and Surgery, Pharmacy, Veterinary Surgery, an Engineering School, a School of Drawing and Architecture, a School of Politics, and one of Criminal Law. The library (of which Cardinal Mezzofanti, the celebrated linguist, was once librarian), founded in 1605, contains 170,000 volumes, 48,000 pamphlets, 5000 MSS. and 880 incunabula. The University celebrated its eighth centenary in June, 1888. See Gratian; Canon Law; Civil Law, etc.

BOLOGNA VI'AL, or **FLASK** (first made in Bologna). A short, thick, narrow glass vessel, closed at one end, and open at the other, which the glass-blower prepares from each pot of the melted mixture before employing it in the fashioning of tumblers, glasses, bottles, etc. (See Glass.) It serves the purpose of enabling the glass manufacturer to judge of the color and other conditions of the fused glass or metal; and as the jar is not subjected to anneal-

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ing, it is very friable, and a small angular fragment of any mineral allowed to drop into it at once causes it to fly in pieces. It will be noticed, however, that a Bologna flask will bear a very heavy blow on the outside without being fractured.

BOLOGNA STONE. A radiated or globular variety of the mineral barite. It was originally obtained from a bed of clay in Mount Paterno, near Bologna, Italy, and attracted considerable attention because of the phosphorescence which it exhibited when thrown into a fire in the presence of charcoal. The mineral, when heated with powdered charcoal, is partially reduced to barium sulphide, which, if sealed up in glass tubes after exposure to the sun's rays, will phosphoresce in the dark with a brilliant orange-colored light. This has been long known as *Bologna phosphorus*, and has been used as a luminous paint for coating clock-faces, match-boxes, etc. See LUMINOUS PAINT.

BOLOGNESE, IL, êl bō'lō-nyā'zâ. See GRIMALDI, G. F.

BOLOGNESE (bō-lō'nyēz' *or* bō'lō-nēz) **SCHOOL OF PAINTING.** A school of the latter Fifteenth and Sixteenth centuries, which originated in and remained intimately connected with the Ferrarese School (q.v.). The school usually meant by this name, however, is the so-called Eclectic School, founded by the Caracci (q.v.) at Bologna about 1580. Like the contemporary Naturalist School (q.v.), it was a reaction against the Mannerist School (q.v.) of the Sixteenth Century, which imitated, in a meaningless manner, the forms of Michelangelo and Raphael. The Eclectic School of Bologna was the mother of modern schools of design. Its programme was to unite the best points of the principal schools of the Italian Renaissance: Michelangelo's form, Titian's color, Correggio's light and shade, and Raphael's symmetry and grace. The result of such training was great technical skill, but a lack of originality. The school also placed weight upon the study of nature, especially from the nude, but not to the same extent as the Naturalists, by whom it was much influenced. Its most important representatives will be found treated under the titles CARACCI; GUIDO RENI; DOMENICHINO; ALBANI, FRANCESCO; BARBIERI, FRANCESCO.

BIBLIOGRAPHY. The best modern treatise on the Bolognese School is "Die Malerschule von Bologna," in Dohme, *Kunst und Künstler Italiens*, Vol. III. (Leipzig, 1879). See also Bolognini-Amorini, *Vite dei pittori ed artifici Bolognesi* (Bologna, 1843). Contemporaneous accounts are those of Malvasia, *Felsina pittrice* (Bologna, 1678; new ed. 1841); Baglione, *Le vite dei pittori dal pontificato del Gregorio XIII.* (Rome, 1649).

BOLOM'ETER (Gk. βολή, *bolē*, a throw, sunbeam + μέτρον, *metron*, measure). An instrument invented by Prof. S. P. Langley for the detection of minute changes in temperature, particularly those due to the absorption of radiant energy, and for a comparison of quantities of energy absorbed. It consists essentially of a balanced Wheatstone's bridge (q.v.), through which a feeble current is passing; one 'arm' of this bridge is composed of three strips of platinum blackened and exposed to the radiation, e.g. from the sun; the temperature of this arm rises, its electrical resistance increasing; the balance of the bridge is thus destroyed, and there is a sudden deflection of the galvanometer-needle, varying with the amount of energy absorbed by the arm of the bridge. This instrument was used originally by Langley in his investigation on the radiation from the sun; and within recent years, particularly in Langley's Astrophysical Observatory at the Smithsonian Institution, Washington, the bolometer has proved to be one of the most useful and reliable instruments for the study of radiation. The instrument, is described in Vol. XVI. of the *Proceedings of the American Academy of Arts and Sciences*, p. 342 (Boston, 1881), and in the *Annals of the Astrophysical Observatory* of the Smithsonian Institution, Vol. I. (Washington, 1900).

BOLONDRON, bō-lōn'drōn. A town of Cuba, in the Province of Matanzas, about 35 miles southeast of Matanzas by rail (Map: Cuba, D 4). Population, in 1899, 9200.

BOLOR-TAGH, bō-lōr' tăg' (Turk. *bolur*, snow cloud + *dagh, tagh*, mountain; cf. *Ben-Nevis*). A name formerly given to a mountain range supposed to extend in a north and south direction along the eastern edge of the Pamir plateau connecting the Himalaya, Karakorum, Kuen-ben, and Tian-Shan ranges. The Kizil-Yart Range, attaining in the peak of Mustaghata an elevation of nearly 26,000 feet, may perhaps be taken to represent the Bolor-Tagh.

BOLSENA, bōl-sā'nâ (anciently, *Volsinii*). An Italian town in the Province of Rome, situated on the north shore of the Lake of Bolsena (*Lacus Volsiniensis*), about 20 miles north-northwest of Viterbo. It was one of the twelve great cities of the Etruscans, but is now a town of little importance. The miraculous bleeding of the Host in the hands of a doubting priest at Bolsena caused the institution of the festival of the Corpus Domini, celebrated the Thursday following the first Sunday after Pentecost. The incident has been treated by Raphael. Half a mile from Bolsena are a few traces of the Etruscan city, and many fragments of the Roman one remain. The Lake of Bolsena is a fine expanse of water, about 10 miles long and 8 broad, and is supposed to be the crater of an extinct volcano. The Marta River carries its waters into the Mediterranean. It has two islands, Bisentina and Martana, which were favorite retreats of Pope Leo X. Martana is famous as the scene of the exile and murder of the Gothic Queen, Amalasuntha, by her husband. Theodatus.

BOLSTER (akin to Engl. *bole*, stem, *bowl*, hollow vessel). A piece of soft wood covered with canvas, placed on the trestletree of vessels for the eyes of the topmast rigging to rest upon, and thus prevent the injury to them which would result from being bent downward at a sharp angle. Pieces used for similar purposes elsewhere are also called bolsters; and the name is applied to cushions of tarred canvas and rope which are used to prevent the stays from being chafed when the ship pitches.

BOLSWARD, bōl'svärt (anciently, Lat. *Bolverda*). An old town in the Netherlands, Province of Friesland, 20 miles southwest of Leeuwarden (Map: Holland, D 1). It is surrounded by a navigable canal. The Church of Saint Martin, in the Gothic style, is the largest and handsomest in Friesland. Bolsward's trade is con-

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siderable, and its principal manufactures are bricks and pottery. The town was a member of the Hanseatic League in the Middle Ages. Population, 6500.

BOLSWERT, SCHELTE VAN (1586-1659). A Dutch engraver, born in Bolsward. He engraved chiefly after Rubens, who, it is said, by retouching his plates with the pencil, instructed him in the subtler matters of technique. His principal works include: "The Conversion of the Apostle Paul," "The Marvelous Draught of Fishes," "Landscape with Peasants," "The Vicinity of Mecheln," "The Resurrection," after Rubens, "The Crowning with Thorns," "The Elevation of the Cross," after Van Dyck.

BOLT. A specially constructed metallic pin for fastening together temporarily or permanently parts of structures or machines. Bolts for doors, windows, chests, drawers, etc., are employed to fasten temporarily the objects to which they are applied, and are thrown into and out of use by keys or by means of the hand. Bolts for permanent fastenings are of various kinds, and are given various names, according to their form or the use to which they are put; thus we have round, square, hook, and eye bolts as examples of bolts named according to their form, and we have foundation, rail, tire, shackle, and other bolts named from the use to which they are put. The most common form of bolt is that having a head at one end and a screw-thread at the other. The threaded end is sometimes screwed into the last of two or more parts, but more generally it projects through, and a suitably fitting nut is screwed on to the projecting end. This form of bolt is made by passing heated rods of iron into a machine which automatically cuts off the proper length for a single bolt, and forges a head on one end by pressure; and the blanks thus formed are then threaded in other machines, the heated rods are fed continuously, and the bolts are forged and threaded with astonishing rapidity. Bolts of complicated shape and bolts of larger size for special purposes are forged by ordinary blacksmith-work.

Metal bolts used on board ship are called *through bolts* if they extend completely through a part of the structure, and *blunt bolts* if only extending part way through. Bolts having a hole in the projecting end are called *eye-bolts; ring-bolts* have a ring through the eye. *Lewis bolts* consist of an eye with a tapered lug on one side which fits in a socket in the deck, where it is firmly held by a wedge or key inserted behind it; these bolts are used in the decks where an eye-bolt is needed, but where it is undesirable to have any projection extending permanently above the surface.

BOLT COURT. One of the odd retreats in London, just beyond Saint Bride's Church, off Fleet Street. Its association with Dr. Johnson, who lived there for several years, and with Cobbett, gives it additional interest.

BOLTI, bōl'tĭ, or BULTEE (Ar. *bolting*). A chichlid fish of the Nile (*Tilapia nilotica*), esteemed as food.

BOLTING-CLOTH (ME. *bulten*, OF. *bulter*, *buleter*, Fr. *bluter*, from LowL. *buletare*, to sift, from LowL. *burra*, a coarse cloth; cf. It. *buratto*, sieve). A fine fabric, usually made of unsized silk, and employed in separating the products of flour-mills. See GAUZE; also FLOUR.

BOLTON, bōl'ton, or **BOLTON-LE-MOORS** (from the moorlands where it is situated). An important manufacturing town in Lancashire, England, on the Croal, 10 miles northwest of Manchester (Map: England, D 3). It is one of the principal seats of the cotton manufacture in England, its spinning-factories alone employing over 20,000 workmen. In addition there are large foundries and iron-works, dye-works, paper-mills, soap-factories, and silk-weaving establishments and coal-mines in the vicinity. The municipal enterprise of the town in no way lags behind its industrial activity. Its water-works were municipalized as early as 1847; it owns and operates the gas-works, an electric plant, the electric street railways, and maintains ice-houses, markets, and slaughter-houses, all of which yield a substantial income after covering all expenses of maintenance, interest, and amortization, and saving immense sums of money to the citizens and the city treasury in lower charges. Even the sewage is utilized in connection with a sewage-farm maintained by the city for that purpose. The public baths, numerous recreation-grounds and parks, a higher-grade board school, technical and art schools, five public libraries, and two museums are the results of the city's efforts on behalf of its people. The city returns two members to Parliament. Population, in 1891, 146,487; in 1901, 168,205.

The history of Bolton since very early times is almost entirely industrial. Flemish immigrants in 1337 laid the foundations of the woolen manufactures, and this was further stimulated by the arrival of French Huguenots toward the end of the Seventeenth Century. The inventions of Arkwright and Crompton, who were natives of Bolton, naturally revolutionized industry there, though the new machines were met at first with great disfavor. During the Civil War the town was stormed by the Earl of Derby and Prince Rupert (1644).

BOLTON, HENRY CARRINGTON (1843—). An American chemist, born in New York City. He graduated at Columbia University in 1862, studied at Göttingen, and in 1872-77 was an assistant at the Columbia School of Mines. In 1877 he was appointed professor of chemistry and natural science at Trinity College. He was elected in 1900 president of the Chemical Society of Washington, D. C. His more important investigations have been made in connection with the action of organic acids on minerals. His publications include: *The Student's Guide in Quantitative Analysis* (1885); *The Scientific Correspondence of Joseph Priestley* (1892); *A Select Bibliography of Chemistry, 1492-1892* (1893; with supplements, 1899, 1900); *A Catalogue of Scientific and Technical Periodicals* (1897); and *The Evolution of the Thermometer, 1592-1743* (1900). Dr. Bolton has also pursued investigations in comparative folk-lore, on which topic he has published a number of monographs.

BOLTON, SARAH KNOWLES (1841—). An American author, born in Farmington, Conn. She was at various times associate editor of the *Congregationalist*, assistant corresponding secretary of the National Women's Christian Temperance Union, and vice-president of the American Humane Education Society. Her publications include: *Orlean Lamar and Other Poems* (1863); *The Present Problem* (1874); *How Success is*

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Won (1884); *Poor Boys who Became Famous* (1885); *Social Studies in England* (1886); *Famous American Statesmen* (1888); *Famous English Statesmen* (1891); *Famous Givers and Their Gifts* (1896); and *Our Devoted Friend, the Dog* (1901).

BOLTRAFFIO, bōl-träf'fyō, GIOVANNI ANTONIO. See BELTRAFFIO.

BOLT-ROPE. The rope sewed on the edges of sails to strengthen them and prevent them from tearing. When on the perpendicular edge of a sail, it is called the *leech-roping;* along the bottom of a sail, the *foot-roping;* along the top, the *head-roping.* Some sails, owing to their shape, have no head-roping. All cordage employed in furling, loosing, or setting a sail, if attached to it at all, is, except the burned whip, fastened to the bolt-rope.

BOLTZMANN, bōlts'mân, LUDWIG (1844—). An Austrian physicist, born in Vienna. He studied in Vienna, Heidelberg, and Berlin; was appointed professor of physico-mathematics at the University of Gratz in 1869, and in 1873 professor of mathematics in Vienna. From 1876 to 1890 he held the chair of experimental physics in Gratz, from 1890 to 1895 that of theoretical physics in Munich, and from 1895 to 1900 that of theoretical physics in Vienna. In 1900 he was appointed professor of physics at the University of Leipzig, and in 1902 was recalled to Vienna. He has made valuable researches in connection with thermo-dynamics, the kinetic theory of gases, and other physical problems, and has published *Vorlesungen über Maxwell's Theorie der Elektrizität und des Lichts* (1891-93); *Vorlesungen über kinetische Gastheorie* (1896); and *Vorlesungen über die Prinzipe der Mechanik* (1897, et seq.).

BO'LUS, DR. A character in a humorous poem of the same name, by the younger Colman. It appeared in a volume entitled *Broad Grins.* His versified prescriptions, such as "When taken, to be well shaken," were sometimes disastrously misapplied.

BOLYAI, bōl'yō-ê, FARKAS (German, WOLFGANG) (1775-1856). A Hungarian mathematician. He was born in Bólya, spent his early years of study in Enged, Klausenburg, and Jena, and later studied three years (1796-99) in Göttingen. Here he formed an enduring friendship with Gauss, who was attracted to him by his profound thinking and excellent character. In 1804 he was made professor of mathematics in the Reformed College of Maros-Vásárhely, where he remained forty-seven years. In common with his friend Gauss, with Sacchrei, Lambert, and numerous other mathematicians, Bolyai made many efforts to prove Euclid's postulate of parallelism. But it was reserved for his son, János (John), to declare the *science absolute of space,* which assigns Euclidean geometry to a particular kind of space. The chief work of the older Bolyai, known as the *Tentamen,* contains an appendix of twenty-six pages to Volume I., entitled *Scientiam Spatii Absolute Veram Exhibens.* This little monograph, now so famous, is the work of János.

BOLYAI, JÁNOS (1802-60), was born in Klausenburg. He was a spirited boy; and, partaking of his father's mathematical genius, his progress was marvelous. He finished the Latin school at the age of twelve, passed the philosophic curriculum in two years, and entered the Academy of Engineers in Vienna. In 1823 he was appointed lieutenant at Temesvár, from which place, November 3, 1823, he wrote to his father in positive terms of his conception of parallels: "From nothing I have created another wholly new world." This conception, as formulated by him, became the appendix of the *Tentamen.* His later works, mostly unfinished, as the *Principia Doctrinæ Novæ Quantitatum,* add little to his fame. Consult: Baltzer, *Elemente der Mathematik* (Dresden, 1866); Schmidt, in *Abhandlungen zur Geschichte der Mathematik,* Vol. VIII. (Leipzig, 1895); Halsted, *Bolyai—Non-Euclidean Geometry* (Austin, 1896).

BOLZANO, bōl-tsä'nō, BERNHARD (1781-1848). A German theologian, philosopher, and mathematician. He was born in Prague, was ordained priest in 1805, and was appointed professor of the philosophy of religion at the university there. In 1820 he was removed on account of his liberal teachings, for which he had been denounced in Rome by the Jesuits, and henceforth devoted himself to his literary labors. As a philosopher he was a devoted adherent of Leibnitz, but was also influenced by Kant. He was a mathematician of remarkable ability, and was one of the formulators of the present theory of functions. His most important works are: *Wissenschaftslehre* (1842); *Versuch einer neuen Darstellung der Logik* (1837); and *Paradoxien des Unendlichen* (1851). Consult his *Autobiography,* ed. by Fesl (Vienna, 1875).

BO'MA. The capital of the Congo Free State, Africa, situated on the Congo River, a short distance from the coast (Map: Africa, B 4). It has a well-built residential section, containing the Government buildings, and a business part situated along the coast. It is an important shipping centre, and is also the capital of the District of Boma. It was visited by Stanley in 1877.

BOMARSUND, bō'mär-sund. See ÅLAND ISLANDS.

BOMARSUND (Scand. *bomar,* rail, bar, bolt + *sund,* strait), STRAIT OF. A channel in the Baltic Sea, at the entrance to the Gulf of Bothnia, between Verde and the islands of Åland and Bardö (Map: Russia, B 2). The Russian fortress of Bomarsund, on the island of Åland, was taken in 1854 by the Allies, and its fortifications destroyed. By the Treaty of Paris, Russia must not rebuild the fortress.

BOMB, bōm *or* būm (Fr. *bombe,* from Lat. *bombus,* Gk. *βόμβος, bombos,* a booming, humming; refers to the noise made by the projectile), BOMBSHELL and SHELL. A hollow ball of cast iron or steel filled with combustibles and shot, designed, on the explosion of the shell, to scatter in every direction. When first used, bombs were fired from mortars only; but since the invention of shell-guns and other modern artillery the name *shell* has been gradually substituted. See AMMUNITION; ARTILLERY; ORDNANCE; and PROJECTILES.

BOM'BA (It., bomb). A nickname given to Ferdinand II., King of the Two Sicilies, in consequence of his fierce bombardment of Messina, in September, 1848.

BOMBARD. See ARTILLERY and ORDNANCE.

BOM'BARDIER' (Fr. *bombardier,* It. *bombardiero;* for derivation, see BOMBARDMENT). A

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military title used in the British artillery. Acting bombardier is the first rank above gunner or driver, and bombardier the rank immediately higher. It is an appointment of the major commanding the battery, and, unlike the rank of sergeant, which can only be taken away by a regimental court-martial, may be canceled at any time by the commanding officer.

BOMBARDIER BEETLES (for origin of name, see below). Ground-beetles, Carabidæ, of the genus Brachinus. They are black, green, or blue beetles, with reddish-yellow legs. They live on the surface of the ground, and when closely pursued by an enemy, such as a predatory beetle, they discharge from the anus, with an explosive sound, a drop of fluid which turns to visible smoke-like gas on contact with the air. By the time the pursuer has recovered from astonishment and the inconvenience of this gas, the bombardier has frequently made good its escape; but, if needful, the discharge can be quickly repeated several times. When the reservoir which contains it is opened by dissection, the liquid effervesces and evaporates instantaneously. It changes blue vegetable colors to red, and then to yellow; produces sharp pain when applied to the tongue, and leaves a yellow spot upon its surface like that produced by a drop of nitric acid. There are about twenty-five species in the United States. See GROUND-BEETLE.

BOM'BARDIN'IAN, GENERAL. The name of a general in a burlesque play, *Chrononhotonthologos*, by Henry Carey (1874). He insults his monarch by inviting him to a dinner of hashed pork, and when the latter calls him 'traitor,' slays him in mortal combat.

BOM'BARDIN'IO. The pen-name of William Maginn, founder of *Fraser's Magazine* in 1830.

BOMBARDMENT (Fr. *bombarde*, a cannon, a musical instrument; It. *bombarda*, a musical instrument, a cannon; from Lat. *bombus*, booming noise; cf. *bomb*). An attack upon the fortifications of an opponent by artillery, cannon, and other heavy ordnance. All modern battles begin, when possible, by a heavy bombardment of the enemy's position. (See ATTACK.) The bombardment of a fortified town is a much more difficult undertaking, owing to the practical impossibility of knowing what results are being accomplished, or with what degree of accuracy the aim is taken. With reasonably strong defenses and time for preparation, together with means speedily available for the suppression of conflagration, the modern bombardment is more formidable for its moral effect and usefulness in blockading than for the actual damage it does the enemy, great as that might possibly be. It is an established fact that few modern bombardments have been particularly destructive. At the siege of Paris by the Germans, in the War of 1870-71, an average of 500 shells daily actually fell within the city, but accomplished comparatively little damage. In the British-Boer War of 1899-1902 the bombardment of Ladysmith and Kimberley was of daily occurrence, the deadliest of modern ordnance and explosives being brought into use; but there also little damage was inflicted. Buildings under the flag of the Red Cross are required to be some distance away from the combatants, and are supposed to be exempt from bombardment. According to international agreement, 24 hours' or more notice of bombardment is given for the protection of non-combatants and their property.

The attack of defensive positions by naval vessels is not generally regarded as likely to result in serious injury, but much depends on the character of attack. Moreover, permanent injury may not be sought. In many instances it has been found possible to smother the fire of a fort by rapid fire from the small and medium calibre guns of ships. Where the guns are mounted behind low parapets or breastworks, and the embrasures are large, this may easily be done, if the preponderance of fire of the ships is considerable. At the attack on the defenses of San Juan, Porto Rico, in May, 1898, by the fleet under Admiral Sampson, the Morro batteries, armed with very recently constructed six-inch guns, were silenced, though not much injured. Protected in this way by the fire of the fleet, the torpedo-boat *Porter* was able to go close under the guns of the fort and examine the harbor, in order to ascertain what Spanish ships were in the port. In the various bombardments of the batteries at Santiago, the men were driven from the works, but the damage done was of little account. The bombardment of the town by the vessels of the fleet was very successful, and was the leading immediate cause of the surrender. The guns used were of eight-inch calibre, the shells weighing 250 pounds. The naval vessels fired over an intervening rise of ground with a range of 4 miles, the fall of the projectiles being reported by the Army Signal Corps. For fear of striking in the American lines, the first shells were directed too far to the left, and fell into the water. The next lot —about 25 of them—all fell on the water-front street, in a space about 200 yards long and 30 yards wide. The third lot fell in a space of about the same area, about half way from the water-front to the palace, wrecking the interior of every house they struck, and in some cases destroying the exterior walls. The direction of the firing was again changed, and three shells fell just beyond the palace, passing close to its roof, when the signal to cease firing was seen. The Spaniards realized that the Americans were slowly feeling their way to the intrenchments, and that it was only a question of a very short time when they would be reached and made untenable. As the majority of the inhabitants had left Santiago at this time, no one was hurt by the bombardment. At the same time that the ships were bombarding, the army field-artillery was also throwing shells into the city; but they were too small (weighing less than 20 pounds) to injure buildings or to have much moral effect on the enemy. All other recent bombardments have taught the same lessons as may be learned from these; which are, that the damage done to fortifications is trifling compared to the expenditure of ammunition, but that, when the bombardment is directed against trenches or troops in the open, the actual and moral effects are considerable. It must not be assumed that because ships cannot successfully attack forts the latter can stop a fleet of modern armored ships from running by them. Of course some of the ships may be badly damaged, but if the channel is clear and not too close to the enemy's guns, the greater part of the vessels will probably get by without serious injury. In the *Report of the*

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British Naval and Military Operations in Egypt in 1882, by Lieutenant-Commander Casper F. Goodrich, U.S.N. (published by the Office of Naval Intelligence, Washington, 1885), will be found a detailed account of the bombardment of the fortifications of Alexandria. The results and conclusions derived from them are similar to those hereinbefore mentioned. Compare, also, the attacks on Charleston by the Federal fleet during the Civil War, and the bombardment of Forts Jackson and Saint Philip, below New Orleans, and of Fort Fisher, near Wilmington.

During the Spanish War much fear was expressed that the Spanish squadron would bombard summer resorts and defenseless places on the Atlantic coast of the United States. Apart from other considerations, such a proceeding would have been a foolish waste of ammunition. It is possible that seaport cities may be forced to pay money to secure exemption from bombardment, but wanton destruction is unlikely to be attempted. Its cost is generally out of proportion to the damage inflicted, unless the conditions are very favorable to the attack. An inferior fleet, at a long distance from its base of supplies, cannot afford to use up its ammunition in operations which have no bearing upon the general course of the war, or which would not decrease the power of the enemy's fleet. See COAST DEFENSE, SIEGE AND SIEGE WORKS, and FORTIFICATION, under which titles are described the military tactics to be followed and means employed for defense against bombardment.

BOMBAR'DON. See SAXHORN.

BOMBAS'TES FU'RIO'SO. The title of an opera (1790) by William Barnes Rhodes, a parody of *Orlando Furioso*. It narrates the mock-heroic adventures of Bombastes, a braggart, who becomes jealous of his beloved Distaffina, slays his king for a pair of jack-boots, and is finally killed himself by Fusbos, minister of state.

BOM'BAX. See ERIODENDRON.

BOMBAY, bŏm-bā'. A Presidency of British India, extending along the western coast of the Peninsula from about latitude 14° to about 18° 30′ N. (Map: India, B 5). It is bounded by Baluchistan on the north, Rajputana, Central India, the Central Provinces, Berar, and Hyderabad on the east, Mysore and Madras on the south, and the Arabian Sea and Baluchistan on the west. Area, 184,235 square miles, of which 122,778 square miles is under direct British administration. The rest is under the administration of native chiefs, politically controlled by Great Britain. The western part of the Presidency is partly traversed by the range of the western Ghats, running either close to the coast or retreating about 50 miles inland. They have numerous offshoots into the interior, and their slopes are covered with thick forests. Physically, the Presidency is divided into four parts: Sind, the northern division, with a low surface, mostly unproductive; Gujerat, having a rich, alluvial soil, well watered; Konkan, a mountainous region, very little cultivated and the Deccan, in the south, suffering from insufficient rainfall. The chief rivers are the Indus, which drains only the Sind, the Tapti, and the Nerbudda. The climate, with a few exceptions, is hot and oppressive. A temperature of 130° is not rare, while in some places for about six months in the year the temperature averages about 95° in the shade. In the lower portions the rainy season is sometimes followed by epidemics of fever.

The agricultural products of Bombay are of considerable importance. In the northern portion, where the surface is generally low and even swampy, much attention is paid to the cultivation of rice and wheat, while in the southern portion cotton is the chief crop. The latter is cultivated mostly in the black-soil regions of the southeastern part of the Presidency, and the area under cotton amounts to about 25 per cent. of the total cotton area of British India. Besides cotton, wheat, and rice, Bombay produces large quantities of millet, some oil-seed, and tobacco. Altogether, there are in Bombay over 27,000,000 acres under cultivation, out of a total of 196,000,000 acres for British India. The mineral production of the Presidency is insignificant. The manufacturing industries are chiefly confined to the production of cotton and silk fabrics, leather, and brassware. The cotton-manufacturing industry was started in 1854, and since then has had a rapid development, employing over 130,000 people in 1899. Besides exporting immense quantities of raw cotton to Great Britain, Bombay supplies a large portion of the domestic demand, and exports some to other parts of India. In regard to the volume of commerce, Bombay is exceeded only by Bengal. In 1885 the imports and exports amounted to Rs.340,093,729 ($110,160,000) and Rs.379,602,960 ($123,000,000), respectively. In 1900 they had increased to Rs. 453,042,205 ($146,772,000) and Rs.439,868,383 ($142,550,000), respectively. The chief exports are sugar, tea, wool, cotton, cotton fabrics and woolens, and drugs; the imports consist mostly of machinery, metals, and liquors.

In 1900 Bombay, including the native States, had over 6400 miles of railway lines, or 27 per cent. of the total railway mileage of British India. The lines belong either to the Imperial Government or to the native States, but they are mostly operated by private companies.

The administration of the Presidency is vested in a Governor and an Executive Council, whose members hold office by appointment; while the legislative power is in charge of a Legislative Council, made up of the Governor and the Executive Council, with the addition of a few appointed members representing the European residents and the natives. The native States are controlled by means of agents attached to the native courts. For administrative purposes the Presidency is divided into the four divisions of Northern, Central, Southern, and Sind. Justice is administered by the high court at Bombay and numerous district courts. The revenue is made up from land revenue, monopolies, taxes, and customs. The revenue and expenditures for the fiscal year 1900 amounted to Rs. 135,703,045 (about $44,000,000) and Rs. 108,715,882 ($35,224,000) respectively.

Instruction is furnished by 13 colleges, about 500 secondary public schools, over 9000 primary public schools, and 2650 private primary schools. The University of Bombay is only an examining body. Altogether, there are about 12,640 educational institutions, with a total attendance of over 600,000 children, of whom about 60 per cent. are Mohammedans. The population of the

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British portion of the Presidency, including Aden (attached to the Bombay Presidency), was 18,873,342 in 1891, and 18,584,496 in 1901, while the population of the native States decreased during the same period from 8,059,298 to 6,891,691. Including the native States, the population of the Presidency is composed of the following elements: Hindus, 78 per cent.; Mohammedans, 16 per cent.; Jains, about 2 per cent.; the remainder comprising over 300,000 Animists, about 77,000 Parsees, over 170,000 Christians, and 13,000 Jews.

Consult: Drew, *Bombay and Its Feudatories* (Bombay, 1892); Douglas, *Glimpses of Old Bombay and Western India* (London, 1900).

BOMBAY (Hind. *Bambai*, Malay *Bambé*, after the goddess *Bambé Mumba*, through popular etymology turned by the Portuguese into *Bom bahia; bon*, Lat. *bonus*, good, fair + *bahia*, haven, port). The capital of the Presidency of the same name, British India, lies in latitude 18° 56′ N., longitude 72° 54′ E., on the former island of Bombay, now a peninsula artificially connected with Trombay, Salsette, and other adjacent islands, and with the mainland (Map: India, B 5). Bombay Island, 11½ miles long, from 3 to 4 miles broad, has an estimated area of 22 square miles, and with the city forms an administrative district. The city occupies the entire breadth of the south end of the island, and has two water-fronts, one on the outer Back Bay and the other on the splendid inner land-locked harbor, which has an area available for shipping purposes 14 miles long by 5 miles broad. It is defended by batteries equipped with modern armament, and by a small navy comprising torpedo-boats, torpedo-catchers, and two conspicuous monitors. Bombay vies with Calcutta as the commercial capital of India, surpassing the former as a centre of distribution and having double the coasting trade. It is the terminus and departing point of various European steamship and mail lines, and of the Great Indian Peninsula Railway, and of the Bombay, Baroda and Central India Railway. It possesses one of the finest railway depots in the world, extensive docks, basins, graving-docks, and ship-building slips; the Government dockyard covers about 200 acres. The principal portion of the city, with long, wide streets, traversed by street railways and lined by fine commercial establishments of every description, presents a thoroughly European aspect. The objects most worthy of note are the town hall, the library of the Asiatic Society, the mint, cathedral and various churches, the University Library, University Hall, custom-house, post-office, public-works office, missionary houses, the Elphinstone Institution, the Grant Medical College, Sassoon's High School, the Jamsetjee Hospital, and the Jamsetjee Obstetric Hospital. The city possesses a chamber of commerce, two English theatres and a native theatre, and besides those especially noted, numerous other educational, benevolent, and charitable institutions. Since 1892 the city has owned a modern system of waterworks, supplied from Lake Tansa, 65 miles north. It is lighted by gas and electricity, and owns and maintains abattoirs, markets, public swimming and other baths, gardens, with weekly band concerts, and the esplanade, a favorite promenade. The streets of the native quarter are narrow and winding, but marked by cleanliness; and the well-stocked bazars, temples, and curiously painted houses, thronged by polyglot Oriental crowds, present a most picturesque appearance. Besides several native newspapers, there are three published in the English language.

Always favorably situated for foreign trade, Bombay profited largely by the opening of the Suez Canal, as saving more distance in proportion than any other emporium in the East, and also as being on the direct line between Madras and Calcutta on the one side and Aden on the other. When the Civil War in the United States caused a sudden cessation of American supplies, cotton began to be exported from Bombay in vast quantities, and although the reopening of the Southern ports soon checked the extraordinary activity of trade, Bombay was permanently benefited by the stimulus its commerce received. The chief articles of export are cotton, shawls, opium, coffee, pepper, ivory, and gums. The local industries include the manufacture of yarn, cotton cloth, copper and brass utensils, wood-carving, lacquer-work, pottery, gold and silver thread, leather, and dyeing. More than seventy steam mills are in operation. The chief imports are piece goods, thread, yarn, metals, wine, beer, tea, and silk. Bombay is the seat of various foreign representatives, including a United States consul. The average temperature is 79.2° F., and the average rainfall 70.30 inches. The population, which is exceedingly heterogeneous and dense, amounted in 1891 to 821,800; in 1901 to 770,800. The bubonic plague, in the fall of 1896, proved most destructive among the poorer classes. The Hindus form the largest section of the population, the Parsees number about 50,000, and the rest re Mussulmans, native Christians, Europeans, ndo-Portuguese, Jews, etc. Amid these various classes, the Parsees, or Persians, descendants of fire-worshipers driven from their homes by Mohammedan bigotry, rank next to the English in respectability and influence. The late Sir Jametjee Jeejeebhoy and Sir Dinshaw Manoekjee Petit stand forth as models of merchant princes in enterprise and integrity, in munificence and patriotism; and ever since the ship-building business was established in 1735, the Lowji family, assisted chiefly by operatives of the same race, has been at the very head of this, one of the most important interests of the city—not merely the Indian Navy, but several Imperial men-of-war, both frigates and line-of-battle ships, having been almost exclusively the work of Parsees. Rudyard Kipling is numbered among the celebrities born in Bombay.

The Portuguese visited Bombay in 1509, about a year before the capture of Goa, and by 1530 it had passed into their possession. In 1661 the island was ceded to Charles II. of England, as part of the dowry of his bride, the Infanta Catharine. He granted it to the East India Company in 1685, who then transferred their presidency from Surat to Bombay. Consult: Windham, "The Town and Isles of Bombay, Past and Present," in Vol. XLIX. of *Society of Arts Journal* (London, 1901); Eastwick, *Handbook to Bombay* (London, 1881); Hunter, *Bombay, 1885-90* (London, 1890).

BOMBAY DUCK. See RUMMALOTI.

BOMBAY ISLAND. See BOMBAY, city.

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BOMBAZINE, bŭm'bâ-zēn' *or* bŏm'· (Lat. *bombycinum*, silk texture, from Gk. *βόμβυξ*, *bombyx*, silkworm; through Fr. *bombasin*). A cloth for dresses, in which the distinguishing characteristic is that the warp is silk and the filling worsted. The cloth has thus a bare look. It is rather fine and light in the make, and may be of any color. The fabric is now little used. It was extensively made, chiefly in Norwich, England, from about 1816.

BOMBPROOF. A military structure capable of resisting artillery shot and shell, particularly that alighting over-head. In permanent fortifications and defenses they are either cut out of solid rock, as at Gibraltar, or constructed of massive masonry, as at Malta, or at Helsingfors, Finland, a position which is considered impregnable. Temporary bombproofs are constructed out of timber and earth, or any other available and suitable material. Galleries are frequently run underground or in hillsides for the protection of the sick, women and children, and non-combatants generally. See BLINDAGE and FORTIFICATION.

BOMB-VESSEL. See MORTAR-VESSEL.

BOMBYCIDÆ, bŏm-bĭs'ĭ-dē (Gk. *βόμβυξ*, Lat. *bombyx*, a silkworm). A family of Lepidoptera with stout, hairy bodies, including the silkworm moths and their allies. They have no frenulum, the first maxillæ are vestigial, and the palpi of the second maxillæ are greatly reduced. "The feelers are bipectinate in both sexes. The fore wings are usually pointed at the tip, and the lower radial nervures bend downward; the hind wings have two or three anal nervures. The caterpillars, with ten fore legs, are elongate, not hairy, but furnished with dorsal humps on some of the segments, often with a spine on the hindmost. The pupa is inclosed in a cocoon of fine silk." (Carpenter.) The Bombycidæ are fairly numerous in southeastern Asia, but less common elsewhere. Several North American forms are known, such as the great cecropia, polyphemus, and luna moths, and the smaller puss-moths, tussock-moths, and tent-caterpillars. These moths have long been noted for the strong attractive power which the virgin females exert on the males, drawing them from long distances, and sometimes in large numbers; collectors utilize this trait to capture specimens, by exposing the females in cages about which males will soon assemble. Consult: Packard, "Monograph of the Bombycine Moths of America," *Memoirs National Academy of Sciences*, VII. (Washington, 1896); Beutenmüller, "Descriptive Catalogue of the Bombycine Moths Within Fifty Miles of New York City," *Bulletin American Museum of Natural History*, X. (New York, 1898); Neumoegen and Dyar, "Revision of the Bombyces of North America," *Journal New York Entomological Society*, 1893 and 1894. See MOTHS; SILKWORM, etc.

BOMFIM, bŏn-fēn', JOSÉ LUCIO TRAVASSOR VALDES, Count (1787-1862). A Portuguese soldier, born at Peniche (Estremadura). In 1828 he fought with the rank of colonel against Dom Miguel, and in 1832, when Dom Pedro landed in Portugal, continued under him the struggle against the usurper. He entered the Cabinet as Minister of War and Marine in 1841; in 1842 took the field against the Absolutists, who had set aside the Constitution of 1837, and in 1844 was compelled to surrender and made his escape to Spain. He was prominent in the insurrection of 1846, and having been routed at Torres-Vedras, was sentenced to banishment to Africa. He returned under the amnesty of 1847.

BOMFORD, bŭm'fērd, GEORGE (1780-1848). An American soldier, born in New York City. He graduated at West Point in 1805, served as an engineer in the construction of fortifications until 1812, and, as an ordnance officer during the War of 1812, rendered valuable services to the Government. Among other things, he invented and introduced the bomb-cannon, called the 'Columbiad,' which was superseded by the Rodman gun at the beginning of the Civil War. He became colonel in 1832, and was chief of ordnance from 1832 until 1842, when he became inspector of arsenals, ordnance, arms, and munitions of war.

BOM JARDIM, bŏn zhär-dēn' (Portug., 'Good Garden'). A city in the State of Ceará, Brazil, 20 miles south of Crato, in a rich and beautiful mountain valley (Map: Brazil, J 6). It is the centre of an extensive district, yielding manioc, sugar, etc. Population, 6000.

BOMMELERWAARD, bŏm'mel-värt. An island of the Netherlands, Province of Gelderland, formed by the Waal and Meuse. It is 16 miles in length, with a maximum breadth of six miles. The district is extremely fertile, and raises, besides other farm produce, considerable flax and hops. The town of Bommel is situated on the island. Fort Saint Andries defends the island on the east, and Fort Loevestein on the west.

BO'NA (plur. of Lat. *bonum*, something good, neut. of *bonus*, good). A general legal term denoting property of any kind, whether real or personal. In the Roman law it was chiefly applied to real estate; in the later civil law it corresponds to the French term '*biens*,' comprising real as well as personal chattels; but in the common law it is confined generally to movables. It is employed in phrases of varied significance used in the English law and, derivatively, though less commonly, in American legal phraseology; as, *bona confiscata*, goods confiscated or forfeited to the crown; *bona notabilia*, property of sufficient value to be noted in an account (formerly in England this was fixed at £5 or upwards, and in London at £10; but by the acts creating the courts of probate this distinction was abolished); *bona paraphernalia*, goods above dower; *bona vacantia*, unclaimed property, as wrecks, treasure trove, waifs, and estrays, which, contrary to the general rule, did not go to the finder, but rested in the Crown; *bona waviata*, property thrown away, as by a thief in flight, by common law going to the King; *nulla bona*, the return of an execution without property found, or the plea of a garnishee without property belonging to or money due the debtor.

BONA (Fr. *Bône*, Ar. *Beled-el-Areb*). A fortified seaport town in the Department of Constantine, Algeria, situated on a bay of the Mediterranean, in latitude 36° 54′ N., longitude 7° 46′ E. (Map: Africa, E 1). The town, divided into two parts, Upper and Lower Bona, is situated in a beautiful district, at the foot of a hill near the embouchure of the Sebus. It has been

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much improved since the occupation by the French in 1832 and beautified by means of the quays and promenades encircling it, and the numerous fountains and gardens to be found all over the city. It is surrounded by walls flanked with square towers, and further defended by Fort Cigogne, on the top of the hill. The fortress built by Charles V. in 1535 stands on a hill over 340 feet high, and has been used as a prison since 1850 for persons sentenced to deportation from France. Among the other public buildings, the Catholic cathedral and the convent of the Sisters of Mercy are most remarkable. Bona has good bazars, shops, markets, reading-rooms, etc.; manufactures of tapestry, saddlery, and native clothing; and a trade in cattle, sheep, wool, hides, corn, coral, fish, olive-oil, tobacco, and wax. In the vicinity are valuable iron-minés, marble-quarries, and cork-woods. There is telegraphic communication with Marseilles and regular steam communication with France, Algiers, and Tunis. A fine harbor of 195 acres with an inner basin of 25 acres dates from 1870. It is visited annually by nearly 3000 ships of more than a million net tonnage. Since the construction of the railroad connecting the city with Algiers, Constantine, and Biskra, Bona has left Tunis behind as a port. The neighboring hills yield a fine water-supply, and the former marshy and unhealthy condition of the surrounding districts has been improved by drainage. The United States is represented by an agent. Population, in 1896, 34,498, of whom over 12,000 were Frenchmen and more than 10,000 were Italians, the rest being mostly natives. Near Bona are remains of the once famous city Hippo Regius, the favorite residence of the Numidian kings, and the episcopal see of Saint Augustine, who died here in 430. Hippo Regius, in early Christian times, was the central station of commerce and civilization in North Africa, and was celebrated for its schools, theatre, aqueducts, palaces, and temples, afterwards changed into churches and monasteries. It was destroyed by the Mohammedans under Caliph Othman in 646. This city was connected with its seaport, the ancient *Aphrodisium* (the present Bona), by a canal, of which the outline may still be seen in a morass.

BONA, GIOVANNI (1609-74). An Italian cardinal, author of *De Principiis Vitæ Christianæ*, and *Manductio ad cœlum*. The latter was translated into English (London, 1672, 6th ed., 1712); and parts of his *Via Compendii ad Deum*, *The Easy Way to God* (1876). His complete works, in Latin, appeared, Antwerp, 1677, 2 vols. His work on the Mass appeared in French (Paris, 1854-55, 2 vols.). He also contributed to the *Acta Sanctorum*. For his biography, consult A. Ighina (Mondovi, Italy, 1874).

BONACI, bō'nȧ-sē' (Sp. *bonasí*, from the native name). A grouper of the genus Mycteroperca, specifically *Mycteroperca bonaci*. See GROUPER.

BONACIEUX, bō'nȧ'syē'. The name of a debased wretch in *Les Trois Mousquetaires*, by the elder Dumas (1844).

BO'NA DE'A (Lat., 'the good goddess'). A mysterious Roman divinity, sometimes identified with Fauna, Ops, or Maia. She was worshiped in Rome from the most ancient times, but only by women, even her name being concealed from men. Her sanctuary was a grotto on Mons Aventinus, which had been consecrated to her by the virgin Claudia; her festival, however (the 1st of May), was not celebrated there, but in the house of the consul, inasmuch as the sacrifices were then offered up for the whole Roman nation. The solemnities were performed generally by aristocratic vestals. At this celebration no males were allowed to be present; even portraits of men were veiled. The wine consumed was called milk, in order that its name might not be discovered, and the vessel in which it was served, *mellarium*. The symbol of the goddess was a serpent, indicating her healing powers, and certain herbs were sold in her temple. In B.C. 62 the notorious Clodius committed the sacrilege of appearing disguised as a woman at the mysteries of Bona Dea.

BONA FIDE, fī'dē (Lat. abl. of *bona fides*, good faith). Literally, 'in good faith.' It is not a technical term of English law; yet it is often used in connection with the transfer or possession of property. If a person takes possession of another's property, honestly believing it to be his own, and, without notice of the other's title, adds to its value, his liability to the owner is for the value of the property when originally taken; but if the taking is in bad faith, he is held liable, generally, for the whole value of the improved property, without any allowance for his enhancement of its worth. A *bona fide* purchaser is one who buys property for a valuable consideration, without notice of any defect in his vendor's title and believing that the vendor has a good right to sell and convey a good title. By the civil-law rule, which prevails on the Continent of Europe and in Scotland, such a purchaser from a trader in the course of his business acquires a perfect title, though his vendor had none. According to the English common law, however, his title is no better than his vendor's. If the vendor had title, but one which was voidable by a third person for fraud (q.v.), the *bona fide* purchaser would be able to hold the property. So a *bona fide* purchaser of property from a trustee (q.v.) clothed with the legal title can hold it as against the *cestui que trust* (q.v.). Again, the *bona fide* purchaser of a negotiable instrument (q.v.) holds it free from any defect of title between prior parties, and free from defenses available to prior parties among themselves. This rule had its origin in the customs of merchants, and received the sanction of common-law courts because it was necessary to enable negotiable paper to discharge the functions of currency.

BONAINI, bō-nī'nē, FRANCESCO (1806-74). An Italian historian, born in Leghorn. He studied in Pisa, and was appointed professor of ecclesiastical law there in 1827 and professor of the history of law in 1840. In 1852 he was appointed general superintendent of the State archives of Tuscany. He was successful as an archivist, and was also exceedingly active as an author and editor. His works include *Storie Pisane* (1844-45); the *Cronache e storie di Perugia* (1850-51); and the posthumous *Acta Henrici VII.* (1878).

BONALD, bō'nȧl', LOUIS GABRIEL AMBROISE, Vicomte de (1754-1840). A French publicist and statesman, born at Mouna, in Aveyron. An ardent adherent of the old monarchy, he was com-

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pelled to emigrate during the French Revolution and went to Heidelberg, where he wrote politico-philosophic works in support of monarchy. His first important work, *Théorie du pouvoir politique et religieux* (3 vols., 1796), was seized by the Directory. It prophesied the restoration of the Bourbons. He returned to France about 1806, won the favor of Napoleon, and in 1808 was appointed Minister of Instruction. In 1815 he was elected to the Chamber of Deputies, and there, as well as afterwards in the Chamber of Peers, was conspicuous by his opposition to all liberal projects, notably the freedom of the press. In 1823 he was elevated to the peerage by Louis XVIII. The July Revolution brought his public career to a close, as he refused to take the oath of allegiance to the new dynasty. His most important writings are: *Législation primitive* (3 vols., 1802), and *Recherches philosophiques sur les premiers objets des connaissances morales* (2 vols., 1818).

BONAN'ZA (Sp., fair wind or weather, prosperity, from Lat. *bonus*, good). A term applied in the mining districts of the United States to the discovery of a rich vein or body of ore. When a vein of rich ore has been struck, the mine is said to be a 'bonanza.' In the celebrated Comstock Lode in Nevada some ten bonanzas were found, the most famous of which, known as the 'Big Bonanza,' was discovered in 1876. The word bonanza has a popular application also to a successful enterprise or to any piece of good luck.

BONAPARTE, bō'nâ-pärt; in Ital., **BUONAPARTE**, bō'nâ-pär'tâ, FAMILY OF. The Bonaparte family originated in Italy, and may be traced in the records of Florence, San Miniato, and elsewhere. The Corsican branch, the only one of historical importance, went to Corsica from Sarzana, in Genoese territory, about 1610, and its representatives took up their residence at Ajaccio, where they occupied a respectable position as patricians, *padri del commune* or *cittadini*, without especial prominence until the rise of the great Napoleon. The Grand Duke of Tuscany in 1757 issued a formal patent of nobility to Joseph, the grandfather of Napoleon, and a coat of arms described as: "A count's coronet, the escutcheon with two bends sinister and two stars bearing the letters B. P., signifying Buona Parte, the field of the arms red, the bend and stars blue, the letters and coronet yellow." The title of patrician was also granted by the Grand Duke two years later. In the Eighteenth Century the following representatives of the family resided at Ajaccio; the archdeacon, Lucien Bonaparte; his brother, Napoleon Bonaparte; and their nephew, Carlo.—CARLO BONAPARTE, father of the Emperor Napoleon, was born March 29, 1746; studied law in Pisa, and married, in 1767, a beautiful young patrician, named Letizia Ramolino. In 1768, with his uncle Napoleon, he joined General Paoli in defending the island against the French invaders. When resistance was shown to be useless, Carlo Bonaparte attached himself to the French interest, and in 1771 was included by Louis XV. in the list of 400 Corsican families chosen to form a nobility. In 1773, through the influence of Marbœuf, Governor of Corsica, Carlo Bonaparte was appointed royal counselor and assessor of the town and Province of Ajaccio. In 1777 he was a member of the deputation of Corsican nobles to the Court of France. In this capacity he resided for some time in Paris, where he gained for his son, Napoleon, through the interest of Count Marbœuf, admission into the military school at Brienne. In 1779 he returned to Corsica, and in 1785 went to Montpellier, for the benefit of his health, but died there February 24, 1785. He was a man of prepossessing exterior and amiable character. By his marriage with Letizia, he left eight children; Joseph, King of Spain; Napoleon, Emperor of the French; Lucien, Prince of Canino; Maria Anna (afterwards named Elisa), Princess of Lucca and Piombino, Grand Duchess of Tuscany, Countess of Campignano, wife of Prince Bacciochi; Louis, King of Holland; Carlotta (afterwards named Marie Pauline), Princess Borghese; Annunciata (afterwards named Caroline), wife of Murat, King of Naples; Jerome, King of Westphalia. By a decree of the French Senate, November 6, 1804, the right of succession to the Imperial throne was restricted to Napoleon and his brothers Joseph and Louis, with their offspring. Lucien and Jerome were excluded on account of their unsuitable marriages. Napoleon intended to give the right of succession also to Lucien, by the additional act of April 22, 1815; but this never took effect. As Joseph, the eldest brother of the Emperor, had no son, the descendants of Louis became nearest heirs to the throne.—MARIA LETIZIA RAMOLINO, mother of Napoleon I., lived to see the rise and decline of power of her family, and met them with equanimity and dignity. She was born at Ajaccio, August 24, 1750. After the death of her husband, she lived for some time in Corsica, and in 1793, when the island came under British rule, removed with her family to Marseilles, where she lived in poverty, mainly supported by the pension given to Corsican refugees. After her son became First Consul she removed to Paris, and when he was crowned Emperor, in 1804, received the title of Madame Mère. She never cared for the brilliant surroundings of the Imperial Court, and, remembering former adversities, she was prepared for all that followed. After the downfall of Napoleon Letizia lived with her stepbrother, Cardinal Fesch, in winter in Rome, and in summer in Albano. She died February 2, 1836, leaving considerable property, the result of saving habits during prosperity. Professor Sloane, Napoleon's latest American biographer, describes her as "of peasant nature to the last day of her long life—hardy, unsentimental, frugal, and sometimes unscrupulous."

JOSEPH, the eldest brother of Napoleon, was born at Corte, in Corsica, January 7, 1768, and was educated at Autun. On the death of his father he returned to Corsica, exerted himself to support the younger members of the family, and removed with them to Marseilles in 1793. In 1797 he was elected a member of the Council of Five Hundred, and in the same year was sent as ambassador from the Republic to Rome. In 1800 he was chosen by the First Consul as plenipotentiary to conclude a treaty of friendship with the United States of North America. He signed the treaty of Lunéville, February 9, 1801, and that of Amiens, 1802; and with Cretet and Bernier conducted the negotiations relative to the Concordat. After the coronation of Napoleon Joseph was made commander-in-chief of the Army of Naples, and in 1806 King of Naples. He

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effected many beneficial changes — such as the abolition of feudalism, the suppression of convents, the building of roads, the repression of banditti, and the codification of laws—but these reforms were not managed judiciously; and his humane endeavors frequently came into collision with the ambitions of his Imperial brother, who looked upon Naples simply as a province of the French Empire. He was a lover of the fine arts and a man of progressive ideas, but not a vigorous ruler for stormy times; and he is accused of having left affairs too much in the hands of his minister, Salicetti. In 1808 Joseph was summarily transferred by his brother to the throne of Spain, and Murat took his place as King of Naples. Joseph was not able to cope with the Spanish insurgents, backed by the power of England, and after the defeat of the French at Vitoria, in 1813, he returned to his estate at Morfontaine, in France. When Napoleon recognized Ferdinand VII. as King of Spain, Joseph refused, at first, to abdicate, though he had many times before implored his brother to release him from his royal chains; but he soon submitted, as in all other matters, to the Emperor's will. After the battle of Waterloo he accompanied Napoleon to Rochefort, whence they intended to sail separately for North America. In his last interview with Napoleon Joseph generously offered to give up the vessel hired for his own escape, but meanwhile Napoleon had determined to surrender himself into the hands of the English. After a residence of many years in the United States at Bordentown, N. J., where, as the Count de Survilliers, he employed himself in agriculture, Joseph went to England in 1832, having previously addressed a letter to the French Chamber of Deputies, in which he advocated the claims of his nephew, Charles Louis Napoleon. In 1841 he was allowed to return to his wife, who had remained in Italy since 1815. He died in Florence, July 28, 1844. Joseph was the only one of his brothers for whom Napoleon professed any liking. He was a handsome, intellectual-looking man, of distinguished manners and polished speech. His wife, Julia Marie Clary, born December 20, 1777, was the daughter of a wealthy citizen of Marseilles, and the sister-in-law of Bernadotte, King of Sweden. She was a quiet, unambitious woman, with no taste for the splendors of royalty, which fell to her share during the few weeks only in Naples, for she never went to Spain. Ill health appears to have prevented her accompanying her husband to America. She died in Florence, April 7, 1845. By her marriage with Joseph she had two daughters: (1) Zénaïde Charlotte Julie (1801-54), who became the wife of Lucien Bonaparte's son, the Prince of Canino; (2) Charlotte Napoléone (1802-39), who married Louis Napoleon (who died March 17, 1831), second son of Louis Bonaparte, King of Holland.

BONAPARTE, LUCIEN, Prince of Canino, and brother of Napoleon, was born March 21, 1775, and received his education at the College of Autun, the military school at Brienne, and the seminary at Aix. Rising gradually from one office to another, he was elected to the Council of Five Hundred, spoke against the wasteful distribution of State property, and formed a party favorable to the views of his brother Napoleon. Shortly before the 18th Brumaire (1799), he was elected president of the Council of Five Hundred, and was the hero of that day. Afterwards appointed Minister of the Interior, he was active in the encouragement of education, art, and science, and organized the prefectures. As ambassador to Madrid, 1800, he contrived to gain the confidence of King Charles IV. and his favorite Godoy, thus putting aside the British influence which had until then been exercised at the Court of Spain. It is said that for his services in the treaty of peace concluded between Spain and Portugal, September 29, 1801, he received 5,000,000 francs. His constant opposition to Napoleon's progress toward monarchy involved Lucien in several misunderstandings with his brother; and their quarrel was brought to an issue by Lucien's second marriage against the wishes of Napoleon. The crowns of Italy and Spain were offered to Lucien on condition that he would divorce his wife; but he refused them, and preferred living in retirement at his estate of Canino, in the Province of Viterbo, near the frontier of Tuscany, where he devoted his time to art and science. Here he enjoyed the friendship of the Pope, who created him Prince of Canino; but having denounced in his private capacity the arrogant and cruel policy of his brother toward the Court of Rome, he was 'advised' to leave the city in which he was at that period residing. In 1810 he took ship for America, but fell into the hands of the English; was taken to England, and after a debate in Parliament was declared to be a prisoner, but treated with distinction. Upon his brother's downfall he returned to Rome. After the defeat of Waterloo Lucien maintained his presence of mind, advising his brother to dissolve the chambers and assume the place of absolute dictator. After the Restoration of Louis XVII. Lucien lived for some time in and near Rome. In 1830 he went to England, visited Germany in 1838, and died at Viterbo, June 29, 1840. Lucien possessed considerable talents and firmness of character. He was in his early years an ardent republican, but the weakness of the Directory convinced him that a military consulship was necessary to allay the social anarchy of France. He consequently threw himself eagerly into the designs of his brother, but protested against the establishment of a hereditary monarchy. As a writer he was by no means successful. His long and tedious epic poem, *Charlemagne, ou l'Eglise délivrée*, in 23 cantos, was written and published in London, and was dedicated to the Pope (1814). Another heroic poem, *La Cyrnéide, ou la Corse sauvée*, followed in 1819. The *Mémoires secrets sur la vie privée politique et littéraire de Lucien Bonaparte* (2 vols., London, 1819), of which Alphonse de Beauchamp is supposed to be the author, is an untrustworthy book. Lucien was the father of a numerous family. In 1794 he married Christine Boyer, the daughter of a citizen of Saint Maximin. After her death he married, in 1802, the widow of a stock-broker, Madame Jouberthon, who survived him. By his first marriage he had two daughters—Charlotte (1796-1865), who married Prince Gabrielli of Rome; and Christine (1798-1847), who married first a Swedish count named Posse, and then Lord Dudley-Stuart. By his second marriage Lucien had nine children. Charles Lucien Jules Laurent (eldest son of Lucien), Prince of Canino and Musignano, was born in Paris in 1803. He never exhibited any inclination for political life,

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preferring the pursuits of literature and science. He resided in Philadelphia from 1822 to 1828, during which time he studied the birds of the United States and wrote many technical papers published by scientific societies. He published *American Ornithology, or History of Birds Inhabiting the United States Not Given by Wilson* (Philadelphia, 1824-33), which came to be known as "Wilson and Bonaparte's Ornithology," and formed the basis for numerous subsequent editions of Alexander Wilson's great work. After his return to Europe he wrote extensively on American birds in German, French, Italian, and English. Among his works is *Iconografia della fauna italica*. The second son, Paul Marie, born in 1808, took a part in the Greek War of Liberation, and died by the accidental discharge of a pistol, 1827. The third son, Louis Lucien (1813-91), distinguished himself by his studies in chemistry, mineralogy, and languages. Pierre Napoléon Bonaparte, the fourth son, born September 12, 1815, passed through many changes of fortune in America, Italy, and Belgium, returning to France after the Revolution of 1848. In 1870 he shot a journalist, Victor Noir, for which he was tried at Tours, and acquitted of murder, but condemned to pay 25,000 francs to Noir's relatives. He died April 8, 1881. The youngest son, Antoine, born October 31, 1816, fled to America after an affair with the Papal troops in 1836, and returned to France in 1848, where he was elected to the National Assembly, 1849, but retired from politics in 1851. He died in 1877. The eldest daughter, Letizia (1804-71), married, in 1824, Mr. (afterwards Sir) T. Wyse, an Irish gentleman; but a separation took place in a few years. The second daughter, Jeanne (1807-28), distinguished by her beauty and taste for poetry, died soon after her marriage with the Marchese Honorati. The third daughter, Alexandrine Marie, born in 1818, married, in 1836, Count Vincenzo Valentini de Canino, and gave birth to two sons and one daughter. Constanze, the youngest daughter of Lucien, was born in 1823, became a nun, and died in Rome in 1876.

BONAPARTE, LOUIS, third brother of the Emperor Napoleon, was born September 2, 1778, and was educated in the artillery school at Châlons, where he imbibed anti-republican principles. Rising from place to place, he was made King of Holland, 1806; but, in fact, he was never more than a French Governor of Holland, subordinate to the will of his brother. He endeavored, however, to resist some of the demands of the Emperor and replied to one requisition by saying that, since he had been placed on the throne of Holland, he had "become a Dutchman." In 1810 his realm was incorporated with the French Empire. After the restoration of the House of Orange Louis considered himself free from all responsibility, and returned to Paris, January 1, 1814, where he was coldly received by the Emperor. Louis was married, in 1802, to Hortense Beauharnais, daughter of General Beauharnais (q.v.) and Josephine, afterwards Empress of the French. As this marriage was wholly a matter of submission to his brother's will, it naturally ended in unhappiness and separation. After living for some years in Rome—where he separated from his wife—he removed, in 1826, to Florence, where he lived in retirement. On the escape of his son, Louis Napoleon, from the prison of Ham, the ex-King of Holland was removed as an invalid to Leghorn, where he died July 15, 1846. Louis Bonaparte was the writer of several works: *Marie, ou les Hollandaises*, 1814, a novel, giving some sketches of Dutch manners; *Documents historiques, etc., sur le gouvernement de la Hollande*, 3 vols. (London, 1821); *Histoire du parlement anglais* (1820); and a critique on M. de Norvin's *History of Napoleon*.—The amiable and accomplished HORTENSE EUGÉNIE BEAUHARNAIS, the adopted daughter of Napoleon, Queen of Holland, and Countess Saint Leu, was born in Paris, April 10, 1783. After the execution of her father she lived for some time in humble circumstances, until Napoleon's marriage with Josephine. In obedience to the plans of her stepfather, she rejected her intended husband, General Desaix, and married Louis Bonaparte in 1802. After the Hundred Days she visited Augsburg and Italy, and then fixed her residence at Arenenberg, a mansion in the Canton of Thurgau, where she lived in retirement, sometimes spending a winter in Italy. In 1831, when her two sons had implicated themselves in the Italian insurrection, the Countess traveled in search of them through many dangers, and found the elder deceased, and the younger, afterwards Emperor of the French, ill at a place near Ancona. Returning with her son to Paris, she was pleasantly received by Louis Philippe and by Casimir Périer, but was obliged, in the course of a few weeks, to remove with her son to England. Thence she removed to her country-seat, Arenenberg, where she died, after severe suffering, October 3, 1837, and was buried near the remains of her mother, Josephine, at Ruel, near Paris. She was the author of *La Reine Hortense en Italie, en France et en Angleterre, pendant l'année 1831*, and wrote several excellent songs. She likewise composed some deservedly popular airs, among others the well-known "Partant pour la Syrie," which the second Emperor of the French made a national air. Of her three sons, the eldest, Napoleon Louis Charles, born 1802, died in childhood, March 5, 1807. The second, Louis Napoleon, born 1804, Crown Prince of Holland, married his cousin Charlotte, daughter of Joseph Bonaparte, and died at Forlì, March 17, 1831. The third, Charles Louis Napoleon, became Emperor of the French. See NAPOLEON III.

BONAPARTE, JEROME, the youngest brother of Napoleon, was born at Ajaccio, November 15, 1784. After receiving his education in the college of Juilly, he served as naval lieutenant in the expedition to Haiti. When war broke out between France and England in 1803, Jerome was cruising off the West Indies, but he was soon compelled to take refuge in the port of New York. He married Elizabeth Patterson, daughter of a Baltimore merchant, December 27, 1803, after which he remained in the United States more than two years. His marriage was declared null and void by Napoleon. The wife was not allowed to set foot on French territory and was obliged to go to England. Jerome vainly pleaded with Napoleon. In the meanwhile he had been permitted to reënter the naval service and was employed by Napoleon in the liberation of French and Genoese prisoners who had been captured by the Dey of Algiers. In the war with Prussia, he commanded, with General Vandamme, the Tenth Corps in Silesia, and was made King of Westphalia in 1807. He lived in great splen-

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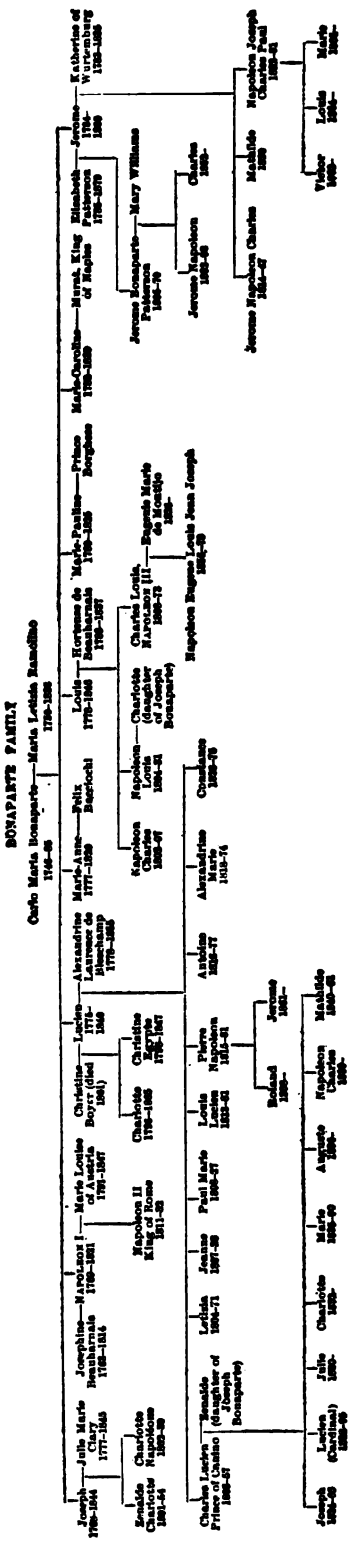
dor at Cassel, the capital of the new kingdom, caring very little for government, not even taking the pains to acquire the language of the country. At the time when he was invested with the crown he was forced to marry Catharine, the daughter of King Frederick I. of Württemberg. After the war with Austria the finances of Westphalia, through mismanagement, plunder, and extravagance, as well as war expenditure, were found in an exhausted condition. The battle of Leipzig brought the reign of Jerome to a close. After the peace of 1814 he left France, and resided first in Switzerland, then at Gratz, and in the beginning of 1815 at Triest. He was made a peer when Napoleon returned from Elba, and fought by the side of the Emperor at Ligny and at Waterloo. After his brother's abdication he left Paris, June 27, and visited Switzerland and Austria, but ultimately settled in Florence. His request to be allowed to return to France was rejected in 1847, by the Chamber of Peers, but was afterwards granted, and at the outbreak of the February Revolution he was in Paris, where he was appointed Governor of the Invalides in 1848, and in 1850 was made a French marshal. He died in 1860. After the battle of Waterloo the King of Württemberg wished to annul the marriage of his daughter Catharine, but she resolved to share through life the fortunes of her husband. Jerome left in America one son, Jerome Napoleon (1805-70), whose descendants reside in Baltimore, and had three children by his second wife. Jerome, born August 24, 1814, died May 12, 1847; Mathilde Lætitia Wilhelmine, Princess of Montfort, who was born at Triest, May 27, 1820, married the Russian Count Anatol Demidoff, and lived with her husband at the Court of Napoleon III.; Napoleon Joseph Charles Paul (commonly called Prince Napoleon), who was born at Triest, September 9, 1822, passed his youth in Italy; entered the military service of Württemberg, 1837; afterwards traveled in several countries of Europe, and was banished from France, 1845, on account of his intercourse with the Republican Party. He returned to Paris with his father, 1847, and after February, 1848, was elected to the National Assembly. He commanded an infantry division of reserve at the battles of the Alma and of Inkerman in the Crimean War. In 1859 he married the Princess Clotilde, daughter of Victor Emmanuel, by whom he had two sons and a daughter. When war with Prussia was declared in 1870, Prince Napoleon proceeded on a diplomatic mission to his father-in-law, at Florence, but failed to obtain the coöperation of Italy with his cousin. After the fall of the Empire he took up his residence in England, but returned to France in 1872. On the death of the Prince Imperial, son of the Emperor Louis Napoleon, in Zululand in 1879, the eldest son of Prince Napoleon became the heir of the Bonapartist hopes. When, in 1886, the chiefs of the Bourbon family were, by a vote of both chambers, expelled from France, Prince Napoleon and his eldest son were exiled also. He died in 1891.

BIBLIOGRAPHY. Leynadier, *Histoire de la famille de Bonaparte* (Paris, 1866); Gregorovius, *The Bonaparte Family* (Eng. trans., Philadelphia, 1855); Larrey, *Madame Mère* (Paris, 1892); Du Casse, *Les rois frères de Napoléon I.* (Paris,



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1883); id., *Mémoires et correspondance du roi Joseph*, 10 vols. (Paris, 1853-55); Lucien Bonaparte, *Mémoirs* (London, 1836); Forchhammer, *Denkrede auf den Fürsten von Canino, Lucien Bonaparte* (Kiel, 1840); *Documents historiques et réflexions sur le gouvernement de la Hollande par Louis Bonaparte* (Paris, 1820); Loosjes, *Louis Bonaparte, de Koning von Holland* (Amsterdam, 1888); *Mémoires et correspondance du roi Jérome et de la reine Catherine* (Paris, 1861-64); Didier, *Life and Letters of Madame Patterson-Bonaparte* (New York, 1879); Bingham, *Marriages of the Bonapartes* (London, 1881); Williams and Lester, *The Napoleonic Dynasty* (New York, 1860).

BONAPARTE, LÆTITIA MARIE WYSE, Mme. de Solms-Rattazzi-de Rute (1829-1902). A French author, born at Waterford, Ireland. She is supposed to have been a granddaughter of Lucien Bonaparte by his second wife, through the marriage of his daughter Letizia to Thomas Wyse, an Irishman. In 1850 she was married to Frédéric de Solms, but after four years separated from him, and, taking the title of Princesse de Solms, settled in Savoy, not then a part of France. Here she founded *Les Matinées d'Aix* (1853), and gathered about her nearly all the celebrities of the day. Among her friends there were Victor Hugo, with whom she kept up a correspondence, Kossuth, Eugène Sue, Lamartine, Lamennais, Dumas, Rochefort, and Tony Revillon. She contributed to the *Constitutionnel*, through Sainte-Beuve, under the pen-name of Baron Stock. After Savoy was annexed to France she went back to Paris and again kept open house, playing a prominent part in the literary and social events of the time. In 1863, de Solms having died, she married Urbain Rattazzi, a well-known Italian statesman, and lived with him in Italy. After his death she returned to Paris. She outlived her third husband, Señor de Rute, a Spaniard, whom she married a few years after Rattazzi's death. Her writings consist of miscellaneous sketches, verses, plays, and novels. Among the latter are *Si j'étais reine* (1868), said to be autobiographical, and *Les mariages de la créole* (1866), reprinted under the title *La chanteuse* (1870).

BONAPARTE, PRINCE NAPOLEON JOSEPH PAUL. See NAPOLEON, PRINCE.

BON'AR, HORATIUS (1808-89). An English Free Church clergyman and writer of hymns. He was born in Edinburgh, and was educated at the university there. In 1837 he was ordained to the ministry at Kelso, where he remained nearly thirty years, when he was called to the Chalmers Memorial Free Church, Edinburgh. He edited several religious journals and published more than twenty volumes of a religious character, among them *Hymns of Faith and Hope* (3 series, 1857-66) and *Selected Hymns* (1879). He was author of the hymns "What a Friend we Have in Jesus," "I Heard the Voice of Jesus Say," and "I Was a Wandering Sheep."

BONAR, JAMES (1852—). A Scottish educator and political economist, born at Collace (Perthshire). He studied at Glasgow University and Balliol College, Oxford, and in 1881 was appointed junior examiner in the English civil service commission. In 1895 he became senior examiner. He was in 1898 president of Section F of the British Association. Among his publications may be mentioned a translation (1877) of J. T. Beck's *Umriss der biblischen Seelenlehre*, a *Catalogue of Adam Smith's Library* (1894), *Parson Malthus* (1881), *Malthus and his Work* (1885), and *Philosophy and Political Economy* (1893).

BONASONE, bō'nâ-sō'nâ, GIULIO (1510-74). An Italian painter and engraver. He was born in Bologna, and was a pupil of Marcantonio Raimondi (q.v.). Some of his paintings are to be seen in the churches of Bologna, but he is best known for his engravings. These, which are after Michelangelo, Raphael, Giulio Romano, and others, although inferior to the work of Raimondi, and often marred by careless or incorrect execution, nevertheless display much ability.

BONA'SUS. The aurochs. See BISON.

BO'NAVENTU'RA (1221-74). A saint and doctor of the Roman Catholic Church. His real name was Giovanni Fidanza. He was born in 1221 at Bagnorea, in Tuscany. In 1238 he became a Franciscan monk; was a theological teacher in Paris, where he had studied, 1248-55; and in 1257 became General of his order, which he governed strictly, but affectionately. The influence of his character now began to penetrate the Church; and it was mainly through his eloquent persuasion that the differences which had sprung up among the cardinals on the death of Clement IV., in 1268, were reconciled, and all induced to unite (1271) in electing to the Papal dignity Tedaldus Visconti (Gregory X.). The new Pope created Bonaventura Bishop of Albano and cardinal in 1273, when he accompanied Gregory to the council at Lyons, where he died, July 15, 1274, from sheer ascetic exhaustion. He was honored with a splendid funeral, which was attended by the Pope, the King, and all the cardinals.

On account of his unspotted character from earliest youth, as well as the miracles ascribed to him, he enjoyed, even during his lifetime, especial veneration. Dante, who wrote shortly after, places him among the saints of his Paradiso; in 1482 he was formally canonized by Sixtus IV. and in 1587 was ranked by Sixtus V. as the sixth of the great doctors of the Church. The religious fervor of his style procured for him the title of *doctor seraphicus*, and his own order, the Franciscans, are as proud of him as the Dominicans are of Thomas Aquinas. A great part of his writings is devoted to the praise of his order, and to the defense of mariolatry, celibacy, transsubstantiation, communion in one kind, and other doctrines and practices of the Middle Ages, which he attempts to deal with in a philosophical manner. His most important works, the *Breviloquium* (Tübingen, 1845; Venice, 1874, 2 vols.), and *Soliloquium*, are properly text-books on dogmatics. Unfortunately, his efforts to philosophize the Church creed, and that deep mysticism in which his spirit reveled, make him often obscure and unintelligible even in his most popular treatises. With Bonaventura theology is the goal of all art and science; and in his *Itinerarium Mentis in Deum*, as also in his *Reductio Artium in Theologiam*, he represents union with God, to which the soul attains through six stages, as the highest good. He did more than any other of the early theologians to give a scientific form

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to the mystical theology. The *Biblia Pauperum*, or 'poor man's Bible,' attributed to him, is a mystico-allegoric explanation of the plain contents of the sacred books for the benefit of the laity. In warmth of religious feeling, however, and in the practical tendency of his ethics, he far excels the hair-splitting scholastics. In his commentary on the *Sententiæ* of Peter the Lombard, he acutely argued against the eternity of the world, and also advanced some original proofs of the immortality of the soul. The most complete edition of his works appeared at Paris (1864-71, 15 vols.). In modern English have appeared his *Life of Saint Francis of Assisi* (London, 1868, 2d ed. 1876); *The Month of Jesus Christ* (1882); and *Instructions for the Season of Lent* (1884). *The Life of Christ* (1881); *The Psalter of the Blessed Virgin* (1852); *The Mirror of the Blessed Virgin Mary* (Dublin, 1849), are works attributed to him. His *Itinerarium* is translated *Journal Speculative Philosophy*, xxi. Consult: *Lexicon Bonaventurianum philosophico-theologicum* (Venice, 1880); and for his life, A. M. Vicenza (from the Italian Paderborn, 1874); *Sixieme centennaire* 15. *Juillet*, 1874 (Lyons, 1874).

BONAVENTURA, FATHER. A pseudonym of Charles Edward Stuart, adopted on his secret visit to England in 1753; mentioned in Scott's *Redgauntlet*.

BO'NAVEN'TURE. A prose pastoral of Acadian Louisiana, by G. W. Cable (1888), containing "Caranero," "Grand Point," and "Au Large."

BONAVINO, bō'nä-vē'nō, CHRIST. See FRANCHI, ANSONIO.

BON'AVIS'TA (It., Good View). The capital of Bonavista District, on a bay of the same name, on the east coast of Newfoundland, 73 miles north by west of Saint John's (Map: Newfoundland, G 4). It is a thriving port of entry and one of the oldest fishing stations on the island. The surrounding land is well cultivated. Islands and rocks make the navigation of the bay dangerous. The entrance is marked by a lighthouse on Cape Bonavista, 150 feet above the sea. Population, 3550.

BON'BRIGHT, DANIEL (1831—). An American educator, born in Youngstown, Pa. He graduated at Yale in 1850, was tutor there in 1854-56, and in 1858 was appointed professor of Latin language and literature in the Northwestern University. In 1899 he was appointed dean of the university, and in 1900-01 was acting president.

BONCHAMP, bôn'shäN', CHARLES MELCHIOR ARTUS, Marquis de (1760-93). A Vendean chief. He was born at Jouverdeil, in the old Province of Anjou; took part in the American Revolution; and when he returned to France was made captain. Of strong Royalist principles, he looked with disfavor on the Revolution. After living for some eighteen months in solitude, he allowed himself to be chosen leader of the Anjou insurgents. The Army of the Vendée would have been more formidable if Bonchamp's tactics had been adopted, but this was not done until it was too late. He fought at Bressuire and Thouars, and in the sanguinary encounter at Chollet, October 18, 1793, received a fatal shot in the breast. He was generous and merciful in his warfare, and the lives of 5000 Republican prisoners are said to have been spared at his dying request. Consult Chauveau et Dussieux, *Vie de Bonchamp* (Paris, 1817).

BONCOMPAGNI, bôn'kōm-pä'nyê, PRINCE BALDASSARE (1821-94). An Italian mathematician. He was born in Rome. His noted critical and historical work, *Scritti di Leonardo Pisano*, appeared in 1857-62. In 1857 he found at the Cambridge library a Latin translation of the famous arithmetic of Al Khowarazmi, which he published in Rome under the title, *Algoritmi, de Numero Indorum*. All traces of this work had disappeared for 250 years. His numerous historical monographs were published, for the most part in the *Bulletino di Bibliografia*, in 20 volumes, edited by him (Rome, 1868-88).

BOND. See MASONRY and BUILDING.

BOND (same word as *band*, a fastening, from the verb *to bind;* for the meaning compare *obligation*, similarly used). In a legal sense, an obligation in writing and under seal by which one party, termed the obligor, binds himself to pay a sum of money to another, termed the obligee. At the present day a contract under seal to perform any other act or duty is generally called a covenant. Bonds belong to the class of specialty contracts and are of two kinds, *simple* and *conditional*, the former where provision is made for the payment of a sum of money only, the latter where a clause is added, in the nature of a defeasance, upon the performance of which the obligation is void, but upon the breach of which the obligation, regarded in the nature of a penalty, is payable. The latter is the class to which the term bond is generally applied in modern usage. In form it consists of: (1) The obligation by which the obligor binds himself his heirs, executors, and administrators, to pay a certain sum of money; (2) any recitals necessary to explain the transaction; (3) the conditions, defining the acts on the performance or breach of which the obligation terminates. In an ordinary surety's bond, or one for the payment of a debt, the obligation is for a sum double the amount of the debt, hence called a 'penalty,' but terminates on the payment of the debt with interest by the debtor. Formerly, the condition was often stated in a separate instrument called the 'defeasance.' Under the old common-law rule on non-performance of the condition of a bond on the day fixed, the penalty was absolutely forfeited and recoverable by the obligee in full, but equity intervened to give relief against such penalty on the payment of the sum or damages actually due with interest sustained, and later statutes confined the recovery at law to the debt or damages actually suffered, so that now a bond amounts merely to the promise of payment of a sum of money, its form being sanctioned by antiquity. One of the great advantages of a bond over an ordinary contract to pay money is that the period fixed by the statute of limitations, in most jurisdictions, in which to bring action is 20 instead of 6 years. Where the obligation runs to more than one obligee, all should join in a suit, unless their rights are expressly declared to be several.

In the United States a bond or like obligation to pay money is usually accompanied by an instrument of security or mortgage upon the property of the debtor or obligor. On default

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the obligee may either sue upon the bond or enforce the payment from the security. A similar usage prevails in the Scotch and English law; in the former, the mortgage of real estate being commonly termed a *bond*. See MORTGAGE.

Bonds issued by corporations and by governments are evidences of indebtedness which differ in form but little from those used in legal transactions by individuals. Corporations are generally empowered by their charters to borrow money by the issue of bonds. These bonds have a definite period to run and bear a fixed rate of interest. The entire bond issue is frequently reinforced by a mortgage upon the property of the corporation, under which the bondholders may, upon default of payment of principal or interest, foreclose upon the property in satisfaction of their claims. This right greatly enhances the value of the security in the case of first mortgage bonds, but is of little practical value in the second and subsequent mortgage bonds so frequently issued by railroad corporations. The number of bonds issued by certain corporations is bewildering. Some depart very widely from the first mortgage bond, and are bonds only in name, and in the fixed rate of interest which they bear. Any obligations issued in a group by corporations are called bonds when they bear a fixed rate of interest. The entire bond issue is divided into part obligations each of which is a bond. They are usually issued in sums of $1000 each, though bonds of $500 and $100 are sometimes issued. In form they are either registered or coupon bonds. In the former case they are issued to individual owners, who in case of sale must authorize the transfer on the books of the corporation or its trustee to the purchaser. Coupon bonds are payable to bearer, and provide for the payment of interest by a series of notes (coupons) attached to the bond, which promise the payment of the interest, usually expressed as a specific sum of money, at the several interest periods. As they fall due they are cut from the bond and presented directly or through a bank for payment. They may be payable at the company's offices or at banking institutions named on the coupons.

Bonds issued by governments are in form similar to those issued by corporations, being registered or coupon bonds. They are not, however, supported by any mortgage, as no citizen can enforce a claim against the State. For their security they rest, therefore, upon the confidence of the purchaser in the ability and good intentions of the issuing government to meet its obligations. In the case of some of the minor governments this confidence has been sometimes sadly misplaced. In the case of refusal by the government to pay the debt or interest the holder is without redress. In some of the States of the Union the issue of bonds by the State governments is hedged about by constitutional restrictions, which have a certain value in preventing excessive bond issues. The same is true of the bonds issued by the minor civil subdivisions of the States, counties, school districts, towns, and cities. See articles DEBT, NATIONAL; REPUDIATION.

Consult: Cook, *Treatise on Stock and Stockholders* (3 ed., Chicago, 1894); Short, *Law of Railway Bonds and Mortgage* (Boston, 1897); Hainer, *Modern Law of Municipal Securities* (Indianapolis, 1898); Dillon, *Law of Municipal Bonds* (Saint Loius, 1876); Throop, *Treatise on the Law Relating to Public Officers and Sureties in Official Bonds* (New York, 1892). Also the authorities referred to under FORECLOSURE; MORTGAGE; TRUST; MUNICIPAL CORPORATION.

BOND, EDWARD AUGUSTUS, Sir (1815-98). An English librarian and scholar, born at Hanwell. In 1867 he became Keeper of the Manuscript Department of the British Museum, and from 1878 to 1888 he was principal librarian of the Museum. In 1870 he founded (with E. M. Thompson) the Palæographical Society, of which he was long president. It was he who brought about the printing of the British Museum catalogue. He edited *Statutes of the Colleges of Oxford* (1853); *Speeches in the Trial of Warren Hastings* (1859-61); the *Travels of Jerome Horsey* (for the Hakluyt Society), and *Facsimiles of Ancient Manuscripts* for the Palæographical Society, 5 vols. (1873-88).

BOND, GEORGE PHILLIPS (1825-65). An American astronomer, the son of William Cranch Bond (q.v.). He was his father's assistant in the Harvard Observatory, succeeding to full charge in 1859. He published a *Treatise on the Construction of the Rings of Saturn; Elements of the Orbits of Hyperion and the Satellite of Neptune; The Method of Least Squares;* and *Mathematical Memoirs upon Mechanical Quadrations.* For a work on Donati's comet he received a gold medal from the Royal Astronomical Society.

BOND, WILLIAM CRANCH (1789-1859). An American astronomer, born in Portland, Maine. He was self-educated, and had a private observatory at Dorchester, Mass., where his discoveries attracted much attention. In 1838 he was chosen by the United States Government to make observations for the use of the Wilkes exploring expedition to the South Pacific, and in 1839 he supervised the construction of the observatory at Harvard, and became its director. He was the inventor of a method of measuring time to a very small fraction of a second, and among the first to employ photography in stellar observations.

BONDAGE (LLat. *bondagium*, inferior tenure, held by a husbandman, from *bondus*, AS. *bonda*, householder, husbandman). A form of rural tenure which obtains in Scotland, based upon an obligation of the tenant, called a bondager, to render agricultural services to his landlord. It is a survival, in modified form, of the base tenure of villeinage (q.v.), which prevailed in the early history of the feudal system (q.v.). See COPYHOLD.

BONDER, bŏnd'ẽr (Norw. *bonde*). In Norway and Sweden, the landowners or farmers. Under the ancient kings of Norway they were a powerful class, and often forced important concessions from their rulers, or deposed them. They correspond nearly to burgesses and barons in England.

BONDI, bŏn'dê, CLEMENTE (1742-1821). An Italian poet, born at Mezzano, near Parma. He was educated by the Jesuits and when still very young was appointed to deliver lectures in rhetoric in the royal seminary at Parma. Here he produced his first work, *Giornata vil-*

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lereccia (1773), intended to be a humorous picture of the rural pleasures of the brotherhood. Having celebrated in verse the abolition of the Jesuit Order, he was subjected to a priestly persecution, and compelled to conceal himself in the Tyrol; but ultimately he found a patron in the Austrian Archduke Ferdinand, who made him librarian at Brünn. Later he fixed his residence in Vienna, where he died. His poems are lyrical, descriptive, satirical, and elegiac, and are chiefly distinguished by the elegance of their versification and the purity of their style. Among his longer works may be mentioned *La conversazione*, *La felicita*, and *Il governo pacifico*. Italians consider Bondi's translation of the *Æneid* to possess remarkable excellence. His entire works were published in Vienna in 1808.

BONDMAN, THE. A tragedy by Massinger (1623); a minor opera by Balfe (1846); a novel by Hall Caine (1890), the scene of which is laid in the Isle of Man and Iceland.

BONDU, bŏn-dōō′, or BONDOU. One of the constituent States of the French colony of Sénégal, between latitudes 14° and 15° N., separated from Bambuk by the river Faleme. The soil is very fertile and well watered, and yields millet, indigo, corn, rice, and cotton. Gold and iron are found in considerable quantities. Cotton fabrics are woven by the natives, who belong to the Fulah race and number about 30,000. The predominant religion is Mohammedanism. The King resides in Bulibani, the capital, with a population of over 2000.

BONDU'CA. The title of a tragedy by Fletcher, acted before 1619, but not printed until 1647. It was several times altered, one of the alterations bearing a new title, *Caractacus*. It deals with the unsuccessful defense of Britain by Boadicea against the Romans under Suetonius Paulinus. The same title was used for plays by Charles Hopkins (1697) and Richard Glover (1753).

BONE (AS. *bān*, Ger. *Bein*, bone, leg; cf. Icel. *beinn*, straight). The hard material of the skeletons or frameworks of mammalian animals, reptiles, most fishes, and birds. In the embryo, it is preceded by cartilage (q.v.), which consists of cells massed together, except in the flat bones, as those of the skull and shoulder-blade, of which the primary foundations are to a great extent of fibrous tissue. Points or centres of ossification form, the cells alter their form and arrangement, and a deposit of earthy materials, phosphate and carbonate of lime, takes place, rendering the former flexible substance rigid. By soaking a bone in dilute mineral acid, we can dissolve these earthy matters and render it again flexible, ossein, or bone cartilage, alone remaining. On the other hand, if we expose it to intense heat, the animal matter (gelatin) is burned, and though the bone retains at first its form, a slight touch will cause its now unsupported earthy matter to crumble away. We see, in the ill-nourished children of large towns, too many examples of how necessary is a proper relation of these two elements of bone to each other. In the disease called rickets (q.v.), the earthy matter is deficient, and the too flexible leg-bones bend under the weight of the trunk. In the aged person, again, the bone-substance becomes more densely packed with earthy matter and becomes brittle, rendering the bones peculiarly liable to fractures. Animals lower in the scale than vertebrates have, in place of bone, mineral concretions or incrustations, principally consisting of carbonate of lime. Besides constituting the skeleton, bone occurs in plates in certain animals, as in turtles' integument, the heart of certain ruminants, the tongue of certain fishes, etc.

The specific gravity of bone is between 1.87 and 1.97. It is twice as strong as oak, and a cubic inch of it will support 5000 pounds.

The bones of the skeleton are classified according to their shapes — viz., as long bones (e.g. the thigh-bone and arm-bone), flat bones (as the shoulder-blade and skull-bones), short and irregular bones (as those of the wrist or vertebræ). The substance of bones is arranged differently in different parts—either hard and close, which is called the condensed substance, or loose and recticulated, called the cancellated structure. *Long bones* have a shaft of hard substance, terminating at each end in soft or cancellated structure; in the latter situations, the bone is more expanded and rounded off to enter into the formation of a joint. *Irregular bones* consist of a shell of condensed tissue, inclosing a mass of cancellated structure, and are smoothed off into surfaces adapted to those of the adjoining bones. *Flat bones* consist of two layers of hard tissue, with an intermediate cancellated structure. Anatomists class as *mixed bones* those which are both long and flat, as the ribs, the breast-bone, and the lower jaw.

HISTOLOGY. Bone belongs under the general histological classification of connective tissue, its hardness being due to the deposition in its intercellular substance of calcareous matter. Bone may be divided into two varieties—compact and spongy. The former makes up the hard outer shell of the various bones, while the latter is found in the interior. Bones are covered externally by the periosteum (q.v.). They are largely supplied with blood-vessels, which are carried into them from the periosteum, the largest being those which enter the cancellated ends of the long bones. The long bones are hollow, the central portion being filled with marrow. This central canal is lined by a membrane which receives a special artery for the supply of the adjacent compact tissue. This vessel enters the bone rather above the mid-point, and divides into two branches—an ascending and a descending—which subdivide and anastomose with the vessels already mentioned as entering the cancellated bone. After the arteries enter the compact tissue of bone they run in small capillary canals, which permeate the bone and anastomose, forming oblong loops or meshes. The veins of bone are also contained in these canals, and are larger than the arteries. These capillary canals in which the vessels run are named 'Haversian,' after their discoverer, Clopton Havers, an old English anatomist. They vary in diameter from $\frac{1}{3500}$ to $\frac{1}{200}$ of an inch. They take a longitudinal direction, and if a transverse section is examined under a microscope it appears pierced with holes, which are the Haversian canals cut across. Each canal is surrounded by its own layers of bone, forming a sort of thick-walled cylinder with the Haversian canal as the centre. Between the layers are seen numbers of minute spaces arranged concentrically around the Ha-

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versian canal. These spaces are known as *lacunæ*, and each one has passing off from it, in a radiate manner, numerous small canals or *canaliculi*, which anastomose with canaliculi from other lacunæ belonging to the same system, and probably serve as lymph-channels for the nutrition of the bone. The lacunæ are not empty, but contain bone cells or corpuscles, which are nucleated bodies and send out fine processes into the canaliculi. In addition to the Haversian systems are irregular *lamellæ*, or layers of bone, which fill in the spaces left between the systems, and are known as interstitial *lamellæ*. Along the surface of the bone, and also along the side of the central canal, the *lamellæ* are arranged parallel to the surface, and are known as *circumferential lamellæ*. The cavities of bones and the various nutrient channels which run through them are filled with a substance called *marrow*. In all bones of young animals the marrow is red in color, and is known as red marrow. As the bone grows older the marrow becomes lighter in color from the accumulation of fat, and is known as yellow marrow. Marrow consists of a delicate connective-tissue network, in which ramify numerous small blood-vessels. In the meshes of this network are found various kinds of cells—marrow-cells, or rather large oval cells; giant cells, or myeloplaxes; large cells containing several nuclei; red-blood cells; nucleated red-blood cells; white-blood cells; connective-tissue cells; and fat-cells. The periosteum is a connective-tissue membrane, rich in blood-vessels, which invests the surface of all bones except where they articulate with other bones. Connective-tissue fibres ('Sharpey's fibres') extend from the periosteum into the superficial layers of the bone.

With the exception of the flat bones of the head, all bones are first represented by masses of hyaline cartilage which resemble in shape the future bone. The cartilage is covered over with the primitive periosteum, or perichondrium. From this membrane blood-vessels extend into the cartilage at some point, usually near the centre of a long bone, and a rearrangement of the cartilage-cells occurs. This point is known as the *centre of ossification*. New cells, probably derived from the white-blood cells, appear and are known as osteoblasts. Each osteoblast surrounds itself with a little layer of bone, and is then known as a bone-cell. In compact bone the formation of the Haversian systems is due to the laying down of the bone in concentric layers around the blood-vessels. During the development of bone within the cartilage (intra-cartilaginous development), bone is also being formed under the periosteum (subperiosteal development). Here, also, the bone is formed by the osteoblasts surrounding themselves by bone. The flat bones like those of the skull are not laid down in cartilage like the long bones, but develop in a membranous connective-tissue matrix (intramembranous development). Except for the absence of the preëxisting cartilage, the process is quite similar to that which occurs in intracartilaginous development.

Nerves may be seen entering bone, and the acute pain felt in some of its diseased conditions proves their existence; but they have not yet been actually demonstrated in the osseous tissue; neither have *lymphatics*, though we suppose, from analogy, that bones are supplied with them. The several bones composing the animal frame will be treated of under the head SKELETON; any important peculiarities in the bones of different classes of animals, under the heads of these classes.

CHEMICAL COMPOSITION OF BONE. The principal chemical ingredients present in bone are gelatin and phosphate of lime; and the following table represents the composition in 100 parts of bone of average quality:

CONSTITUENTS	Human Bones	Ox-bones
Gelatin	33.30	33.30
Phosphate of lime	53.04	57.35
Carbonate of lime	11.30	3.85
Phosphate of magnesia	1.16	2.05
Carbonate and chloride of sodium	1.20	3.45
	100.00	100.00

The gelatin of bones remaining behind after treatment with dilute hydrochloric acid has the size and shape of the original bone, but is, of course, soft, somewhat transparent, flexible, and even elastic. If this soft, gelatinous residue of bone be boiled with water, it dissolves in great part therein, and yields a solution which *sets*, or gelatinizes, on cooling. A more common way of extracting the gelatin from bone is to heat the bones covered with water in a digester to a temperature of 270° to 280° F., when much of the gelatin dissolves out and leaves the earthy salts with the remainder of the gelatin. Besides the marrow (q.v.), a little fat is generally found permeating the entire structure of the bone, which can be extracted by throwing the bones into hot water, when the grease or fat exudes and floats to the surface. In some of the larger bones of man and other mammalia, there is a central cavity containing a considerable amount of fatty matter, popularly known as *marrow*. These cavities are not found in the bones of the young animal, but gradually form as the animal approaches maturity. In the sloth, cetacea, seals, and a few other animals, the cavities are not found. Occasionally, as in man, the elephant, giraffe, etc., the bones in the head have cavities filled with air instead of marrow. The uses to which a bone may be put are various. In the cooking of soups, bones form a constant ingredient, and become useful in supplying gelatin, which gives a *body* to the soup it would not otherwise possess. How far gelatin is of itself nutritious is a disputed question. (See GELATIN and NUTRITION.) Animals, however, like the dog, which masticate, devour, and digest the entire bone, do derive benefit therefrom, in part from the gelatin and in other part from the earthy substances; and the same remark applies to the use sometimes made of small fish, where, after being thoroughly browned, they are entirely eaten. In times of scarcity in Norway and Sweden, the poorer people even eat the bones of mackerel and other fish.

Bone is largely used in making the handles of small brushes, the more common table knives and forks, and penknives, and in the manufacture of the cheaper sort of combs (q.v.). Our forefathers, before the metals were known, fashioned fish-hooks out of bone, and used the spines

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in the tail and back fin of certain fishes for pointing arrows. These uses of bone, coupled with the employment of the serrated teeth of sharks as a war weapon, are still practiced by many uncivilized tribes. The fatty and other organic matters in bone allow of its being employed as a fuel where coal or wood cannot be obtained, as in the pampas of South America and the steppes of Russia. In these regions it is considered that the heat evolved during the combustion of the bones of an ox suffices to cook the flesh. See also BONE FERTILIZERS.

BONE, HENRY (1755-1834). An English enamel painter. He was born at Truro, in Cornwall, February 6, 1755. He was apprenticed to a manufacturer of china, but in 1799 moved to London, where he made designs in enamel for jewelers. His merits as an artist were soon recognized; the beauty of his work attracted the notice of the Royal Academy; and he was admitted to that institution, first as an associate, afterwards, in 1811, as a full academician. His copies of the "Sleeping Girl," by Sir Joshua Reynolds, brought him early fame, but his most beautiful examples were the execution of eighty-five portraits of illustrious men and women of Queen Elizabeth's time. All were reproduced in enamel, and were of sizes varying from 5 by 4 to 13 by 8 inches. These exquisite portraits, so greatly admired in the time of Bone, were disposed of by public sale after his death, and are now in the hands of private collectors. Bone was enamel painter to their Majesties George III., George IV., and William IV. He executed miniatures after Raphael, Titian, and Murillo. He died December 17, 1834. See J. H. Wilmot-Buxton, *English and American Painters* (New York, 1883); C. E. Clement, *Painters, Sculptors, Architects, and Engravers* (Boston, 1899).

BONE-ASH. See BONE FERTILIZERS.

BONEBLACK, ANIMAL CHARCOAL, or CHAR. A substance prepared from carefully selected, clean, hard bones made by heating them in retorts, out of contact with air, until they are carbonized. In this process combustible gases and water, together with oil and the vapors of various salts of ammonia, are given off, and boneblack is left in the retort. It is generally reduced to coarse grains from about the size of small peas, down to large pinheads, and is extensively used in the arts for decolorizing liquids, such as the sirup of sugar, and solutions of argol (impure cream of tartar). It is capable of removing various mineral substances from their solutions, and is therefore used in filters for separating chemical impurities from water. The general mode of using the boneblack for the purpose of decolorizing liquids is to allow the liquid to percolate through a layer of the charcoal, when all color is arrested, and the sirup of sugar runs through clear and colorless. This power of absorbing coloring matters is possessed also by vegetable (peat or wood) charcoal, but not to such an extent as by boneblack. The application of heat to the liquids before filtration greatly facilitates the decolorization, and where the volume of liquid to be operated upon is not great, the most expeditious method is to boil the liquid and boneblack together, and then strain through filtering-paper or cloth. The power of absorbing colors appears to be due to the porosity of the substance; it is extremely improbable that the absorption of color is due to a chemical process. When sirup of sugar and other liquids have been run through boneblack for some time, the pores of the latter appear to get clogged with the color, and the clarifying influence ceases; then the boneblack requires to undergo a process of *revivification*, which usually consists in reheating it carefully in ovens, or iron pipes inclosed in a furnace, when the absorbed color is charred, and the boneblack can be of service once again as an arrester of color. After several reburnings, the boneblack becomes of very inferior absorptive quality, and is disposed of for the manufacture of fertilizers. Boneblack has also the power of absorbing *odors*, especially those of a disagreeable nature, and can be employed to deodorize apartments, clothing, outhouses, etc. See BONE FERTILIZERS.

BONEBREAKER (for derivation see below). The giant fulmar petrel (*Ossifraga gigantea*), which is nearly as large as an albatross, and belongs in the South Pacific. It breeds upon Kerguelen and neighboring islands, and feeds mainly upon the carcasses of dead seals and cetaceans, the bones of which it is able to smash with its powerful vulture-like beak. It is called 'Nelly' by the sealers. See FULMAR, and Plate of FISHING SEA-BIRDS.

BONE CAVE. See CAVE.

BONE COAL. A term used in the anthracite regions to designate lumps of coal containing shaly matter. In the sizing and sorting of anthracite the bone coal has to be separated by hand or by machinery. See ANTHRACITE.

BONE-DOG. The bone-shark. See DOGFISH.

BONE FERTILIZERS. Bones have long been used and are highly valued as a fertilizer. Sir John Lawes, of England, early in his career, recognized their value for this purpose and established a factory for treating them with sulphuric acid to increase their effectiveness, according to the process suggested by Liebig. Bones are valuable as a fertilizer on account of the nitrogen and phosphoric acid they contain. The proportions of these depend upon the kind of bones, and the method of treatment to which they are subjected. Untreated bone consists chiefly of tricalcium phosphate bound together by gelatinous matter rich in nitrogen. If raw bone is soaked in dilute hydrochloric acid the calcium phosphate is dissolved, leaving a tough, elastic, gelatinous mass behind; if it is burned, a friable earthy mass—bone-ash—is obtained. If subjected to the action of superheated steam, more or less of the gelatinous matter is remo ed, leaving a product richer in phosphoric acid and poorer in nitrogen than the original.

RAW BONES. According to Voorhees, raw bones free from meat and excess of fat should contain a considerable amount of phosphoric acid and 4 per cent. of nitrogen. They are highly valued as a fertilizer, although they often contain a considerable amount of fat which interferes with their decomposition in the soil. Bones from which the fat has been removed by extraction with solvents, such as benzine or petroleum, contain a high percentage of nitrogen (sometimes 6 per cent.) and about 20 per cent. of phosphoric acid, are easily ground, and decompose readily in the soil.

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BONE-MEAL, BONE-DUST. These are different names applied to the same thing, viz., very finely ground bone. The product may be finely ground raw bones, but it usually consists of bones which have been boiled, steamed, or extracted with solvents previous to grinding.

STEAMED BONE. A large part of the bone used for fertilizing is either boiled or steamed. This treatment removes the fat, which interferes with the action of the bone as a fertilizer, but is valuable for other purposes, and the larger part of the nitrogenous matter, which is valuable as a fertilizer and also for the preparation of gelatin and glue. Bones degelatinized by steaming contain from 28 to 30 per cent. of phosphoric acid and 1.25 to 1.75 per cent. of nitrogen. Steaming at a high temperature improves the mechanical condition of bones.

DISSOLVED BONES. This is the term applied to the product resulting from the action of strong sulphuric acid upon bones. The acid converts the insoluble (tricalcium) phosphate into soluble (monocalcium) phosphate, and calcium sulphate, or gypsum:

$$(Ca_3(PO_4)_2 + 2H_2SO_4 = CaH_4(PO_4)_2 + 2CaSO_4).$$

The product is a dark-colored, coarse, soft powder. This method of treating bones is little used at present, because soluble phosphates are more easily and satisfactorily prepared from mineral phosphates and because bones are sufficiently effective as a fertilizer without such treatment.

BONE-TANKAGE. This is a product which consists of bone mixed with meat-scrap and blood or other slaughter-house refuse in a fine state of division, and is usually richer in nitrogen and poorer in phosphoric acid than pure bone. Several different grades are recognized in the trade, in which the phosphoric acid varies from 7 per cent. (tankage, q.v.) to 19 per cent. (nearly pure bone).

BONE-ASH, the product resulting from the burning of bones, is imported in considerable quantities from South America. It contains no nitrogen, and its fertilizing value depends entirely upon the phosphoric acid present. This is quite variable; but good samples should contain, according to Voorhees, from 27 to 36 per cent. Bone-ash is applied as a fertilizer, either directly or after being converted into superphosphate (q.v.) by treatment with sulphuric acid, as in case of dissolved bone.

BONEBLACK. This is the product resulting from the carbonization of bones by heating in closed vessels. It is used for clarifying solutions, especially sirups, as a pigment, and as a fertilizer, either directly or after treatment with sulphuric acid. It is usually the spent boneblack from refineries that is used in the manufacture of fertilizers. The boneblack from this source is somewhat variable in composition, but usually contains from 32 to 36 per cent. of phosphoric acid. Dissolved boneblack, the form in which it usually appears as a fertilizer, contains about 16 per cent. of phosphoric acid soluble in water and in ammonia citrate (reverted). This is one of the most important sources of superphosphates in fertilizers. See article BONEBLACK.

The nature and composition of bone is such that it gradually yields its nitrogen and phosphoric acid for the use of the plant in the soil; and while it is sometimes treated with acid, as described above, to render its phosphoric acid more available, it is probably most effective when applied in the fine-ground condition and to slow-growing crops. It is the only one of the phosphatic materials, except phosphatic slag (q.v.), which is so used with advantage.

BONEFISH. See LADYFISH.

BONELLI, bō-nĕl'lē, FRANÇOIS ANDRÉ (1784-1830). An Italian zoölogist. He was born at Cuneo (Piedmont), became a professor in the University of Turin, a director of the Museum in Turin, and a member of the Academy of Sciences there. He made extensive scientific journeys in Europe, and published a number of highly esteemed works on entomology, such as *Specimen Faunæ Subalpinæ* (1807).

BONER, bōn'ĕr, CHARLES (1815-70). An English author, born at Weston. He was a special correspondent of the London *Daily News*, and also wrote for the New York *Tribune* and other well-known newspapers. Many notable translations from the German were made by him, including particularly Hans Andersen's *Danish Story-Book* (1846), and *Dream of Little Tuck* (1848). His other works include *Chamois-Hunting* (1853); *Verses* (1858); *Forest Creatures* (1861); and *Transylvania: Its Products and Its People* (London, 1865).

BO'NER, JOHN HENRY (1845—). An American poet, born at Salem, N. C. He learned the printer's trade, and in 1867 was editor of the *Salem Observer* and the *Asheville Pioneer*. He was chief clerk of the North Carolina House of Representatives from 1869 to 1870, and was in the civil service at Washington from 1871 to 1887. He removed to New York in 1887, and was a member of the staffs of the *Century Dictionary*, the *Literary Digest*, *A Library of American Literature*, and the *Standard Dictionary*. In 1901 he again undertook bureau work at Washington. He has published *Whispering Pines* (1883), a volume of verse. His best-known poem is *Poe's Cottage at Fordham*, first published in the *Century Magazine*.

BONER, bō'nĕr, ULRICH. One of the oldest German fabulists. He was a preaching friar of Bern, and is frequently mentioned in documents of the years 1324-49. His collection of 100 fables, entitled *Der Edelstein*, was published at Bamberg, 1461, and was one of the first German books printed. It is marked by purity of style and by clear and vivid delineation. This book is one of the greatest of bibliographical rarities, not more than two copies being known to exist. Bodmer and Breitinger published a complete edition of the work at Zurich, in 1757, under the title *Fabeln aus den Zeiten der Minnesinger*. Recent years have seen frequent reprints, notably in Reclam's *Universal-Bibliothek* (Leipzig, 1895).

BONES. Originally four pieces of the ribs of horses, or oxen, held in the hands and rapped together to mark time and rhythm. In early times the bones were called 'knicky-knackers,' a word originating in the old English *nakerers*, mentioned in Chaucer's *Knight's Tale*. The fact that Bottom speaks of the 'tongs and the bones' in *Midsummer Night's Dream* is proof that they formed part of the rustic music in Shakespeare's time. They are still played by negro minstrels. See CASTANETS.

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BONESET, or THOROUGHWORT (so named from its medicinal properties), *Eupatorium perfoliatum*. A perennial herb, native of the United States, and growing in moist soil. The leaves and flowering tops are used as a tonic. They have a strong, bitter taste, and are taken in the form of hot tea to produce perspiration. If very strong, it operates as an emetic. To make boneset tea, steep an ounce of dried leaves in a pint of water; let it stand two hours, and strain. Boneset is a domestic remedy for influenza, muscular rheumatism, etc. See EUPATORIUM.

BONET, bō-nĕt', JUAN PABLO. A Seventeenth-Century Spanish instructor of deaf-mutes, born in Aragon. Pablo Ponce de Leon (died 1584), a Spanish monk, and Pasch, clergyman of Brandenburg, were earlier teachers, but Bonet was the first to publish a manual of method. This is his *Reducción de las letras y artes para enseñar á hablar á los mudos* (1620).

BONE-TUMOR. See ACTINOMYCOSIS.

BONFIGLIO, bôn-fē'lyô, or **BUONFIGLIO**, bwôn-fē'lyô, BENEDETTO (c.1425-c.96). An Italian painter of the Umbrian School. He lived at Perugia, where he painted the frescoes in the Palazzo Communale (1454-61). These frescoes prove him superior to any of the Umbrians of his time, except Piero della Francesca. It has been said that he afterwards followed Pinturicchio to Rome and assisted in the decorations of the Vatican.

BONFIRE (originally *bone-fire*, as in a gloss of 1483; "*bonefyre*, ignis ossium," i.e. fire of bones). In its earliest usage, a funeral pyre; a fire lighted to consume heretical or forbidden books, etc.; in the early superstitions of Germany (where it was also called *Notfeuer* or needfire) and most other European nations, a fire kindled in time of pestilence among men or cattle to drive away the disease. Later, the kindling of such fires, with many traditional ceremonies, became a regular part of the observances on the night before the festival of Saint John the Baptist or Midsummer Day—still with the ancient idea of driving away plagues and evil spirits. The casting of effigies into the flames, still observed in some places, seems to point to a survival of ancient propitiatory sacrifices. It is quite likely that all these ceremonial observances are relics of pagan worship of the heavenly bodies, modified by the introduction of Christianity. The Church, as in many other instances, preferred to adopt and consecrate what would have been almost impossible to suppress: thus the inclusion in the Catholic Easter ceremonies of the blessing of the new fire, and the custom in the Russian Church of carrying lighted tapers on that festival, may be related to the custom of the *Osterfeuer* among the Teutonic nations, which originally was probably celebrated on the 1st of May. Consult: Jahn, *Die deutschen Opfergebräuche bei Ackerbau und Viehzucht* (Breslau, 1884); Brand, *Popular Antiquities*, Vol. I., edited by Ellis (London, 1849). For the customs more particularly associated with the Celtic races, see BELTANE.

BONGAR, bôŋ'gär (native name). A serpent; genus Bungarus. See KRAIT.

BON GAULTIER, bôN gô'tyâ', BALLADS OF. The title of a witty, satirical volume of verse by Professor William Aytoun and Theodore Martin, published in 1854. The ballads originally appeared in *Blackwood's Magazine*, and were mostly on the topics of the day, including some excellent parodies.

BONGHI, bôŋ'gê, RUGGERO (1828-95). An Italian man of letters and politician. He was born in Naples, March 20, 1828. His literary activity began at the age of 20, with a translation of Plato's *Philebus*. His active share in the political events of 1848 forced him into temporary exile; and a chance meeting at Lake Maggiore with Manzoni and Rosmini-Serbati soon bore fruit in his much-discussed *Critical Letters on the Reason Why Italian Literature is Not Popular* (3d ed., 1873). In 1858 appeared his translation of Plato, *Opere di Platone*, and of the *Metaphysics* of Aristotle; and the following year he refused to receive from Austria a chair of philosophy in the University of Pavia, but afterwards accepted it from his own country, when Pavia had reverted to Italy. Thereafter he was connected successively with the universities of Turin, Florence, Milan, and finally (1870) Rome, where he was professor emeritus of ancient history at the time of his death. Bonghi was a man of great activity and many interests. From 1860 he sat almost continuously in the Chamber of Deputies, where he supported the Conservative Party. In 1874-76 he was Minister of Public Instruction. In journalism he was equally active, editing successively the *Perseveranza* of Milan, and the *Unità Nazionale* of Naples, and founding the *Stampa*, which is still the leading journal of Turin, and the magazine *Coltura*, which he edited until his death in 1895. He was for many years president of the Italian Press Association. Among his many published works may be mentioned: *Pius IX. and the Future Pope* (1877); *Leo XIII. and Italy* (1878); *Contemporaneous Portraits: Cavour, Bismarck, Thiers* (1879); *Disraeli and Gladstone* (1882); *History of Rome* (1884-88); *Arnoldo da Brescia* (1884); *The Roman Festivals* (1891).

BONGO, bôŋ'gô. A name applied to a negro people dwelling in the Upper Nile basin, between the Dinka and the Zandeh. They are slightly blended with Hamites. They are of reddish skin and medium stature, and are vigorous and fleshy, with crisp hair. They subsist by the chase, upon their flocks, and by agriculture. They are skilled in the working of iron. Their neatly thatched houses and granaries are conoid in shape, and the former are surmounted with lookouts. Little costume is worn, but the Bongo are fond of adornment. The women tattoo the upper part of the body, and wear labrets in the upper lip, straws through the alæ of the nostrils, and rings through the septum of the nose.

BONGO. A large West African bushbuck (q.v.).

BONHAM, bŏn'am. A town and the county-seat of Fannin County, Tex., about 75 miles northeast of Dallas, on the Texas and Pacific and the Denison, Bonham and New Orleans railroads (Map: Texas, F 3). It is the seat of Carleton College (Christian), opened in 1867. The city is the centre of a fertile agricultural district, and has a large export trade in cotton, grain, flour, and live stock. The industrial establishments comprise flouring-mills, cotton-gins,

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BONESET, ETC.

1. BONESET (Eupatorium perfoliatum).
2. CLIMBING FUMITORY (Adlumia cirrhosa).
3. BURDOCK (Arctium lappa).
4. VIRGIN'S BOWER (Clematis virginiana).
5. HEDGE BINDWEED (Convolvulus sepium).

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cotton and cottonseed-oil mills, railroad machine-shops, carriage and wagon works, planing-mills, etc. Population, in 1890, 3361; in 1900, 5042.

BONHAM, Milledge L. (1815-90). An American soldier and statesman. He was born in South Carolina, and in 1834 graduated at the South Carolina College. He served in the Mexican War, and was a State-Rights Democrat in Congress from 1856 to 1860, but withdrew when his State passed the ordinance of secession, and was made a major-general in the Provisional Army of South Carolina. In 1861 he entered the Confederate Army as brigadier-general, and led a brigade at the battles of Blackburn's Ford and Bull Run, but resigned his commission (1862) to take a seat in the Confederate Congress. He was Governor of South Carolina from 1862 to 1864, when he returned to the army, and served until the close of the war.

BONHEUR, bô'nĕr', François Auguste (1824-84). A French painter, brother of Rosa Bonheur. He was born in Bordeaux, November 4, 1824. His landscapes are noted for their softness and beauty. He was honored with numerous medals, and in 1867 was made Chevalier of the Legion of Honor. He died February 23, 1884.

BONHEUR, Jules Isidore (1827—). A French painter and sculptor of animals, younger brother of Rosa Bonheur. He was born in Bordeaux, May 15, 1827. He was represented in the Salon of 1848 by both painting and sculpture, but afterwards abandoned painting. He received medals in 1865 and in 1867. Among his works are "The Tiger-Hunter" and "The Zebra and Panther."

BONHEUR, Marie Rosa (1822-99). A French artist, deemed the most eminent woman painter of animals. She was born in Bordeaux on October 22, 1822, the eldest of four children. Her father, Raymond Bonheur, who was a drawing-teacher, gavê her careful training at an early age; but it was mainly her own study of animals in their natural environments that developed her genius. The family moved to Paris when Rosa Bonheur was eleven years old, and here she copied industriously in the Louvre and the Luxembourg, and also studied from nature. The studio in the Rue Rumford, where the family lived, has been described as a kind of Noah's Ark. Birds, hens, ducks, sheep, dogs, shared the apartments, and every day Mademoiselle Bonheur's two brothers took the quadrupeds down six flights of stairs and out to pasture. At the age of nineteen Mademoiselle Bonheur first exhibited at the Salon a picture of "Rabbits Eating Carrots." Thereafter, until 1855, she was represented annually in the Exhibition. In 1845 she received a gold medal of the third class, and in 1848 a first-class medal. Her first great picture, deemed by some her best, "Ploughing in the Nivernais," was exhibited in 1849, and was bought for the Luxembourg. Meanwhile the studio in the Rue Rumford had been given up, and the artist was studying at abattoirs on the outskirts of Paris. Finding the attentions of the workmen disagreeable, she adopted trousers, and as she had short hair, she easily passed for a man. In 1849, on the death of her brother Raymond, she assumed charge of a school of drawing for young ladies, which he had been directing. In 1853 she exhibited the famous "Horse Fair." This picture attracted widespread admiration. She offered it to her native town of Bordeaux for 12,000 francs, but the offer was not accepted, so she sold it in England for 40,000 francs, and it was exhibited there and afterwards in America. It was finally purchased by Mr. Cornelius Vanderbilt for the Metropolitan Museum of Arts in New York City for $55,500. The artist made a replica, a quarter size of the original, from which the engravings of the picture were taken. This replica is in the National Gallery in London; there is also a smaller replica in London and a water-color.

Rosa Bonheur bought a Gothic château at By, near Fontainebleau, and in 1850 went there to live. Here, in 1864, Napoleon III. and the Empress Eugénie visited her studio. The Empress requested the Cross of the Legion of Honor for her; but there was opposition on the ground that the decoration had never been given to a woman except for some deed of bravery and charity, so the Emperor withheld it. The next year, however, while he was in Algeria, the Empress, who was Regent in his place, visited Mademoiselle Bonheur and conferred the Cross. During the latter part of her life she lived quietly at By. She died May 25, 1899. As a painter she showed a sound and wholesome feeling for nature, not only in the modeling of her animals and in her spirited representations of action, but also in the truthful landscape setting in which she placed her subjects. This is notable in the "Ploughing in the Nivernais," in which the sky and upturned earth are rendered with great truth of relative values. Among her best-known paintings are: "The Haymaking Season in Auverane" (1865); "On the Alert;" "A Foraging Party;" and "A Combat Between Two Stallions." In the Metropolitan Museum of Arts in New York is her "Deer in the Forest," and in the Lenox Library is her "Deer Drinking." For a more extended account of her life and works, consult: Laruelle, *Rosa Bonheur, sa vie et ses œuvres* (Paris, 1885); René Peyrol, *Rosa Bonheur: Her Life and Works;* Richard Muther, *History of Modern Painting* (London, 1896); and C. H. Stranahan, *A History of French Painting* (New York, 1899).

BONHOMME, bô'nŏm', Jacques (Fr., James Goodman). A term of depreciation applied by the French nobility and others to one of the masses, more narrowly to the peasant.

BONHOMME RICHARD, rē'shär', The. See Jones, John Paul.

BONI, bō'nê. A former kingdom occupying the southwestern part of Celebes (q.v.), and covering an area of about 1000 square miles (Map: East India, F 5). Boni was once one of the most important kingdoms of Celebes, and it was only with considerable difficulty that the Dutch succeeded in establishing their authority there in 1860. At the beginning of the century the British were compelled to send several punitive expeditions against the Bonese for interfering with the British sea trade. The population of Boni, which consists mainly of Bugis, is estimated at from 200,000 to 300,000. Capital, Boni, on the eastern coast.

BON'IFACE. The name of nine Popes, most of whom are of no historic note. Boniface I. (Pope, 418-422), on account of prevailing party divisions, was opposed by a rival bishop, but was

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recognized by Honorius as proper successor. His letters are in Migne, *Patrol. Lat.*,XX.—BONIFACE II. (Pope, 530-532). His letters are in Migne, LXV.—BONIFACE III., who was Pope for only ten months in the year 607, was the first to whom the title of Universal Bishop of Christendom was conceded by the Greek Emperor (Phocas). —BONIFACE IV. (Pope, 608-615).—BONIFACE V. (Pope, 619-625).—BONIFACE VI. (Pope, 896).—BONIFACE VII. (Pope, 974-984-985).—BONIFACE VIII. (Benedetto Gaetano, Pope, 1294-1303). He was born at Anagni, and was elected Pope on December 24, 1294. His inauguration was distinguished by great pomp: the kings of Hungary and Sicily held the reins of his horse as he proceeded to the Lateran, and, with their crowns on their heads, served him at table. In 1296 Boniface issued his bull *Clericis Laicos*, forbidding the payment or collection of taxes on ecclesiastical property without the consent of the Holy See. He failed in his attempts to assert a feudal superiority over Sicily, and to exercise his Papal authority in the disputes between France and England. Philip the Fair, of France, supported by the estates and clergy, maintained the independence of the kingdom, disregarding many bulls and briefs, and even the sentence of excommunication to which the Pope proceeded. Philip at last, with the aid of Italian enemies of Boniface, made him prisoner at Anagni, whither he had fled; and although he was liberated by the people of Anagni after two days' imprisonment, he died within about a month (October 11, 1303), in consequence of having refused food during those two days, through fear of poison. He instituted the Roman Jubilee in the year 1300, and in 1302 issued the bull *Unam Sanctam*, which maintained that the subjection of the temporal to the spiritual power was an article of faith necessary to salvation. For his life, consult: Luigi Tosti, 2d ed. (Milan, 1848, French trans. Paris, 1854); W. Druncann (Königsberg, 1852).—BONIFACE IX. (Pietro Tomacelli, Pope, 1389-1404). He was a native of Naples, and succeeded Urban VI. as Pope at Rome, while Clement VII. was Pope at Avignon. He exceeded all his predecessors in the continued sale of ecclesiastical offices and benefices and of dispensations and indulgences. He acquired, after a struggle, a most absolute power in Rome, which he kept in awe by fortresses; but to secure himself against external enemies, particularly Louis of Anjou, whose claim to the crown of Naples he had opposed, he was obliged to give away part of his territory in fiefs, as Ferrara to the house of Este.

BONIFACE. The name of a rascally landlord of Lichfield, in Farquhar's *Beaux' Stratagem*.

BONIFACE, ABBOT. The abbot of Saint Mary's, in Scott's *The Monastery*. He is vain and self-indulgent, but charitable, hospitable, and lenient. Despite the troublous times in which he lives, he is enabled at the close of the story to preserve his convent. He resigns, in the sequel, in favor of the more zealous Abbot Ambrosius.

BONIFACE, SAINT (680-755). The Apostle of Germany, whose original name was Winfrid. He was born at Crediton, in Devonshire, England, 680. He first entered a monastery in Exeter at the age of 13, and afterwards removed to that of Nutshalling, where he learned rhetoric, history, and theology, and became a priest at the age of 30. At that time a movement, proceeding from England and Ireland, was going on for the conversion of the still heathen peoples of Europe: in 614 Gallus and Emmeran had been sent to Alemannia, Kilian (murdered 689) to Bavaria, Willibrord (died 738) to the country of the Franks, Swidvert to Friesland, and Siegfried to Sweden. Winfrid also took the resolution (715) of preaching Christianity to the Frisians, among whom it had as yet found no entrance. But a war broke out between Charles Martel and the King of the Frisians, and Winfrid returned from Utrecht to his convent, of which he was elected abbot. He declined the election, repaired to Rome in 718, and received the authorization of Pope Gregory II. to preach the Gospel to all the tribes of Germany in 719. He first went to Bavaria and Thuringia, then labored three years in Friesland, and traveled through Hesse, everywhere baptizing multitudes, and consecrating their idolatrous groves as churches. In 721 Gregory II. called him to Rome; made him bishop (722), with the name of Bonifacius; furnished him with new instructions or canons, and with letters to Charles Martel and all princes and bishops, requesting their aid in his pious work. Returning to Hesse and Thuringia (723), he destroyed the objects of heathen worship (among which are mentioned an oak at Geismar, near Cassel, sacred to Thor, and an idol named Stuffo, on a summit of the Harz still called Stuffenberg), founded churches and convents, and called to his aid priests, monks, and nuns from England, whom he distributed through the various countries. In recognition of his eminent services, Gregory III. sent him (732) the pallium, and named him Archbishop and Primate of all Germany, with power to establish bishoprics wherever he saw fit. Boniface now made a third journey to Rome (738), and was appointed Papal Legate for Germany. The bishoprics of Ratisbon, Erfurt, Paderborn, Würzburg, Eichstädt, Salzburg, and several others owe their establishment to Saint Boniface. The famous Abbey of Fulda is also one of his foundations (742-44). He was named Archbishop of Mainz by Pepin (744), whom he consecrated as King of the Franks at Soissons (752), and he presided in the council held at that place. In 754 he resigned his archbishopric at Mainz, and resumed anew his apostolic labors among the Frisians: and at Dokkum, near Leeuwarden, in West Friesland, this venerable Christian hero was set upon by a mob of armed heathens and killed, along with the congregation of converts that were with him (June 5, 755). His remains were taken first to Utrecht, then to Mainz, and finally to Fulda. In the abbey there is still shown a copy of the Gospels written by him, and a leaf stained with blood. A collection of his letters, and the canons he promulgated for the discipline of the newly established churches, have been preserved, and are instructive as to the state of Germany at the time. The best edition of his *Letters* (Epistolæ) is that of Dümmler (1892). In 1811 a monument was erected to Saint Boniface on a hill near Altenberga, in the Principality of Gotha, where, according to tradition, he erected (724) the first Christian church in North Germany. A statue by Henschel of Cassel was also erected to him in Fulda in 1842. His works are in Migne (*Pat. Lat.*, LXXXIX.); also ed. Giles (London, 1844, 2 vols.); for his *Life*, con-

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sult: G. W. Cox (London, 1853); A. Werner (Leipzig, 1875); *Life Saint Winifrid*—the traditional life (London, 1878); O. Fischer (1880); A. Ebrard (Gatersloh, 1882).

BONIFACE II., Margrave of Montferrat (?-1207). An Italian soldier, prominent in the Fourth Crusade. He participated in the war against Saladin, and was taken prisoner at Hittin (1187). In 1201 he joined the Fourth Crusade. He became ruler of Macedonia and Greece, under the title of King of Thessalonica, in 1204. He was killed near Mosynopolis in a battle with the Bulgarian invaders.

BONIFACIO, bō'nē-fä'chō, STRAIT OF. The ancient Fretum Gallicum, between Corsica and Sardinia; it took its modern name from the little fishing-town of Bonifacio, which is at the southern extremity of Corsica (Map: Italy, D 6). The strait, which is seven miles wide at its narrowest part, is dangerous to navigate on account of the swift current and the rocks, and at times tempestuous winds. Oyster, tunny, and coral fisheries are prosecuted in its waters.

BONIFACIO VENEZIANO (c.1525-c.1579). An Italian painter, born in Venice. He was a member of the Venetian School, and painted "Saint Jerome and Saint Margaret;" "Saint Barnabas and Saint Sylvester;" and "Saint Anthony and Saint Mark"—all in the Venice Academy—and other works.

BONIFACIUS, bŏn'ĭ-fā'shĭ-ŭs. A Roman general of the Fifth Century A.D. He fought against the Goths at Massilia in A.D. 413, and against the Vandals in Spain, in A.D. 422. He was subsequently Governor of Africa under Valentinian III., and appears to have been successful in his administration. Having been maliciously advised by Aëtius (q.v.) that the Regent Placidia purposed his death, he unwisely invited the Vandals under Genseric to settle in Africa. Afterwards, when he perceived that he had been duped, he endeavored to expel the barbarians, but was himself besieged at Hippo, whence he escaped to Italy. Here he regained the favor of the Regent, but was challenged by Aëtius to single combat, and died of his wounds soon afterwards.

BONIFAZIO VERONESE, bō'nē-fä'tsē-ō vā'rō'nā'sā, THE ELDER (1490-1540). An Italian painter, born at Verona, and perhaps a brother to Bonifazio Veronese the Younger. He studied under Palma Vecchio, and imitated Titian, to whom, as well as to Giorgione, many of his works have been attributed. He was a member of the Venetian School, in which he excelled for color. His authenticated works include "The Finding of Moses" (Dresden Gallery) and "Dives and Lazarus" (Venice Academy).

BONIN, bō-nēn', EDUARD VON (1793-1865). A Prussian general, born at Stolp (Farther Pomerania). In 1806 he entered the infantry regiment of Brunswick-Oel, was at Jena and Lübeck, and rose in 1820 to be major. Promoted in 1842 to be colonel, he commanded a Prussian brigade in the War of 1848-49, and having served as commandant of Berlin, was appointed Prussian Minister of War in 1852. He retired in 1854, was again appointed in 1858, but a second time retired in 1859 and was appointed general commanding the Eighth Army Corps at Coblenz. He published a military work entitled *Grundzüge für das zerstreute Gefecht* (Berlin, 1839).

BONIN (bō-nēn') **ISLANDS** (Jap. *Ogasawara-shima*). A group of small islands in the Pacific, situated between Japan and the Ladrone Islands, in about latitude 27° N. and longitude 142° 20′ E. (Map: World, Eastern Hemisphere, G 35). The entire archipelago occupies an area of about 28 square miles, and is divided into three groups—the Parry Islands on the north, Bonin proper in the centre, and Coffin Islands in the south. The largest are Hillsborough and Buckland. They are of volcanic origin, and but few of them are inhabited. The chief products are sugar and indigo. The main port is Port Lloyd, on Peel Island. The population is about 1400. The group was discovered by the Japanese in 1593, and being uninhabited it was named Bunin ('no man's'), whence Bonin. In 1823 Captain Coffin, of the American whaler *Transit*, landed on the most southern island and named it after himself, which fact Captain Beechey knew when he arrived in 1826. In 1828 it was taken possession of by Russia, but no attempt was made toward its colonization. Since 1876 it has been in the possession of Japan.

BON'INGTON, or **BON'NINGTON**, RICHARD PARKES (1801-28). An English painter. He was born October 25, 1801, at Arnold, a village near Nottingham. His father was a painter, of little merit and of a disorderly disposition. Bonington went to Paris with his parents when 15 years old, entered the art school, and also drew in the atelier of Baron Gros. In 1822 he went to Italy. In 1826 he exhibited at the British Institution. His work had been unknown in England, although in Paris his reputation was already established. He worked in both oils and water-colors, and his method was fresh and vigorous; for he went directly to nature for his effects, and recorded faithfully what he saw out of doors. He was, in a sense, an innovator in landscape art in France, although probably influenced by the works of Constable; hence his success in Paris, where new ideas are always welcome. Bonington was noted for his spirited marine and landscape work, as well as figure and genre subjects. He died in London, September 23, 1828, of rapid consumption, the result of a fever caught while sketching from nature in France. He was buried at Saint James's Church, Pentonville. Consult: H. J. N. Buxton, *English and American Painters* (New York, 1883); Richard Muther, *History of Modern Painting* (London, 1896).

BONITO, bō-nē'tō (Sp., Portug. from Ar. *bainīt*, *bainīth*). Any of several species of fishes of the mackerel family. One of these (*Gymnosarda pelamys*) is well known to the sailors as one of the fishes most commonly seen pursuing the flying fishes. It is pelagic, and occurs in all tropical seas, coming north to Cape Cod on the coast of America, and is rarely taken in English waters. The back is bluish, belly silvery, with four brownish stripes on each side parallel with the lower curve of the body. It grows to a length of 2½ feet. The albicore (*Sarda sarda*), another species reaching about the same length, occurs on both shores of the North Atlantic. It is a food-fish of rather low grade. The California bonito (*Sarda Chilensis*) occurs on the west coast of both Americas and in the waters of Japan. It, too, is a poor food-fish.

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BONITZ, bô-nĭts', HERMANN (1814-88). A German classical philologist. He was born at Langensalza, and studied at the universities of Leipzig and Berlin. In 1836-38 he was an instructor in the Blochmann Institute in Dresden. Subsequently he was a professor in the University of Vienna (1849-67), and from 1867 was director of a gymnasium in Berlin, and member of the Academy of Sciences. While in Vienna he devised, with Exner, a system, in force since 1854, for the reorganization of the Austrian gymnasia. He was deeply versed in the philosophies of both Plato and Aristotle, and wrote several expository works, such as *Ueber die Kategorien des Aristoteles* (Vienna, 1853); *Platonische Studien* (Vienna, 1858-60); and *Aristotelische Studien* (Vienna, 1862-67); and edited (Bonn, 1848-49) the *Metaphysica*. See the biography by Gomperz (Berlin, 1889).

BON MARCHÉ, bôn mär'shā'. One of the largest department stores of Paris, noted for its low prices, and interesting on account of its successful application of the principles of coöperation. The business is conducted by a board of managers selected from its employés, who receive a share of the profits in addition to salary.

BONN. A city in the Rhine Province, Prussia, and capital of the Circle of Bonn, advantageously situated on the left bank of the Rhine, about 15 miles southeast of Cologne. The pleasant villas with their gardens on the river, the fine promenades, the picturesque church-towers, and the graceful bridge across the Rhine (completed in 1898), all combine to make Bonn an unusually attractive place. The surroundings also are pleasing and interesting. Of its churches, five Catholic and two Evangelical, the imposing Münster is the most important, a notable example of the late Romanesque style. It is a cruciform building with two choirs, four small towers, and a great octagonal tower. The church dates from the Eleventh Century, and has recently been carefully restored. The interior is without special interest. The neighboring ancient cloisters, with pillars possessing beautiful capitals, are worthy of notice. Among the secular buildings should be mentioned the Rahaus, with its lofty flight of steps, completed in 1782; the famous Beethoven House, where the composer was born in 1770, and now containing the Beethoven Museum; and the buildings of the university for which Bonn is celebrated. The last-named buildings, originally the Electoral Palace, occupy the south side of the old town. The central portion, with its four towers, was completed in 1723. The lecture-room and the library are adorned with busts of Niebuhr, Arndt, A. W. von Schlegel, and many others of Bonn's celebrated professors. The *aula*, or hall, is embellished with interesting frescoes by Cornelius and his pupils.

The Provincial Museum, near the modern railway station, is a handsome building of red sandstone in the Italian Renaissance style. It was erected in 1889-93. It contains a large collection of Roman and mediæval stone monuments and prehistoric antiquities. At the Academic Museum of Art there is a noble collection of casts; among the ancient Greek works are marble Hermæ, bearing heads of Sophocles, Euripides, Aristophanes, and Menander. In the Poppelsdorfer Schloss are the natural history collections of the University. The Observatory is situated near the Poppelsdorfer Allée—a beautiful avenue shaded with horse-chestnuts. Bonn possesses several interesting monuments, among them the statue of Beethoven, executed by Hänel; a fountain column, in honor of Maximilian Frederick; and a bronze monument to Arndt, who died here in 1860. From an old bastion on the edge of the Rhine, known as the Alte Zoll, there is a beautiful view of the river. In the cemetery are the graves of Niebuhr, Schumann, and Arndt. Bonn has long been a favorite residence of English and other visitors.

Bonn is governed by an Over-Burgomaster with three salaried assistants, and by thirty councilmen. It has water-works, a municipal gas plant, and a volunteer fire department. The city, in recent years has become very prosperous commercially. Besides having an active trade, it manufactures machinery, earthenware, chemicals, jute, pianos and organs, porcelain-wares, artificial flowers, faïence, cement, and many other articles. Wessel's porcelain and stoneware factory employs a thousand men. It dates from 1755. The city is well provided with railway and river communications, and with all the modern conveniences connected with manufacturing and commerce. In the village of Beuel, on the other side of the Rhine, are several important spinning and weaving mills. Bonn is the seat of a superior mining court, of a natural history union and agricultural union of Rhenish Prussia, and many other educational and industrial organizations.

In 1900 Bonn had 50,737 inhabitants. Well equipped with schools for elementary education, Bonn offers superior educational advantages. The university (q.v.), with its numerous laboratories and institutes, provides all the facilities of a modern seat of higher learning. Its several charitable organizations include two orphan homes, two hospitals, and two private insane asylums.

Bonn, the *Bonna* or *Castra Bonnensia* of the Romans, is frequently mentioned by Tacitus, and was one of the first Roman fortresses on the Rhine. Investigations show that the Castrum here was very extensive. The town was destroyed by the Normans in the Ninth Century. Having been rebuilt, it acquired some importance when, in 1267, the Archbishop of Cologne transferred his residence and seat of government hither. Two German kings were crowned in its Münster in the Fourteenth Century. Bonn suffered from its Protestant tendencies, and was repeatedly besieged by the Catholics. In 1794 the French marched into the town. They closed its university in 1797, and under their rule Bonn's population decreased. It began to revive as soon as the city was recovered by Prussia in 1814.

BONN, UNIVERSITY OF. Next to Berlin, the leading Prussian university. It owes its origin to Maximilian Frederick, Archbishop of Cologne, who established an academy here in 1777. Seven years later this was made a university by the Emperor Joseph II., which was extinguished by the French invasion. In 1815 the King of Prussia, Frederick William III., decided to establish in the Rhine Provinces a university as an outpost of German thought and influence. After some contest, Bonn was chosen for the site, and in 1818 the university was formally organized.

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While the archiepiscopal residence remains the central building of the university, many others have been added. It had in 1901 over 2400 students, divided among the faculties of evangelical theology, Catholic theology, law, medicine, and philosophy. Its income is nearly 1,300,000 marks, and its library contains 275,000 volumes, 1235 incunabula, and 1376 MSS. There are buildings for the medical department, laboratories, a physiological institute, clinics, and an observatory. Among the great names connected with the faculties are those of Arndt, Niebuhr, and A. W. von Schlegel. Bonn has always been a favorite place for the education of Prussian royalty, and is socially, as well as in scholarship, one of the leading German universities.

BONNASSIEUX, bô'nà'syē', JEAN (1810-92). A French sculptor, born at Pannissières (Loire). He studied in Paris, under Dumont, and received the Prix de Rome in 1836. In 1837 he was ordered to model a colossal statue of Notre Dame de France, for the valley of the Puy, from the bronze of the cannon taken at Sebastopol. Among his works are: "Amour se coupant ses ailes," in the Luxembourg, and "David Berger, 1814." In 1866 he became a member of the Société des Beaux-Arts. For his "Meditation" (1855) he received a medal of the first class and the cross of the Legion of Honor. Ordered to model a statue of Voltaire for the façade of the Louvre, Bonnassieux, a firm Catholic, refused, and in its place a statue of Fénelon was erected. This caused him to become a kind of official sculptor to the French clergy, and much of his work was done for the churches of France.

BONNAT, bô'nà', LÉON JOSEPH FLORENTIN (1833—). An eminent French portrait painter. He was born in Bayonne, June 20, 1833; was a pupil of Léon Cogniet, and studied also in Madrid with Madrazo. In Madrid he was much influenced by the works of Velazquez and Ribera. The deep shadows and strong lights of the latter are often recalled by Bonnat's vigorous method of painting. It is his practice, in producing a portrait, to light the sitter vividly, and to relieve him by the simplest of backgrounds, usually dark, thus isolating the subject so that nothing is in proximity to disturb the effect of concentrated light upon him. Bonnat's portraits are astonishing in their characterization and realism—notably those of Thiers and Don Carlos. He builds up his figures with the plastic sense of a sculptor; he gives them the projection of life itself. Although lacking in æsthetic charm, they suggest the physical presence of the sitter to a degree almost bordering on deception. Strongly drawn and faithfully constructed, they are also powerful in coloring. Among his notable works are the "Martyrdom of Saint Denis," in the Panthéon; "Saint Vincent de Paul Freeing a Galley Slave," and "Neapolitan Peasants Before the Farnese Palace" (1866). Bonnat was chosen chief professor of painting in the Ecole des Beaux-Arts in 1888, and was made a commander of the Legion of Honor in 1882. He took the medal of honor in 1869. Consult: C. H. Stranahan, *A History of French Painting* (New York, 1899); Jules Claretie, *Peintres et sculpteurs contemporains* (Paris, 1884); *Modern French Masters*, ed. Van Dyke (New York, 1896).

BONNECHOSE, bôn'shôz', FRANÇOIS PAUL EMILE BOISNORMAND de (1801-75). A French author. He was born at Leyerdorp, Holland, entered the French Army, served until after the Revolution of 1830, and subsequently was appointed librarian of the Palace of Saint Cloud. From 1850 to 1853 he was librarian of several of the libraries of the civil list. He published: *Histoire de France* (1834); *Les Réformateurs avant la réforme* (1844); *Les Quatres Conquêtes de l'Angleterre* (1851); and *Bertrand du Guesclin* (1866).

BON'NER, EDMUND (c.1500-69). Bishop of London. He was born of obscure and doubtful parentage about 1500. He was educated at Oxford, and there admitted doctor of civil law in 1525. The reputation he gained at Oxford by his knowledge of the canon law recommended him to the notice of Wolsey, who made him his chaplain in 1539. After the fall of Wolsey (1530) Bonner took an active share in the endeavor to have Henry VIII. divorced, and received due promotion from that King. In 1533 he was deputed to appear before Clement VII. in Marseilles to appeal for the excommunicated monarch to a general council; but the story that the violence of his threats on this occasion suggested to his Holiness the counter-threats of having him burned alive, or thrown into a caldron of melted lead, may be dismissed as fabrications. In 1540 he was made Bishop of London. The death of Henry cooled his Protestant zeal; and having given proofs of his lukewarmness in the cause of Reformation, he was at length, in 1549, in the name of Henry's successor, Edward VI., committed to the Marshalsea and deprived of his bishopric. The accession of Queen Mary restored him to office (1553), and as vicegerent and president of the Convocation, he was the principal agent in that bloody persecution which has given unhappy notoriety to Mary's reign. On the accession of Elizabeth, in 1558, Bonner accompanied his episcopal brethren to salute her at Highgate, but was, on account of his unpopularity, which antedated his career as persecutor, refused the honor of kissing her hand. On May 30, 1559, he was summoned before the Privy Council, and there refused, with a consistency worthy of due respect, to take the oath of supremacy. He was accordingly deposed from his bishopric and shut up in the Marshalsea, where he died, September 5, 1569.

BONNER, ROBERT (1824-99). An American editor. He was born in Londonderry, Ireland, but while very young emigrated to the United States, learned the trade of a printer, and in 1839 became a compositor on the Hartford *Courant*. He removed to New York City in 1844, and in 1851 bought the *Ledger*, which soon attained an unprecedented circulation on account of its serial stories and its articles by popular contributors, such as "Fanny Fern," Edward Everett, Henry Ward Beecher, Longfellow, Tennyson, William Cullen Bryant, Sylvanus Cobb, and Charles Dickens. In 1887 Bonner handed over the management of the paper to his three sons.

BONNET. See SAIL.

BONNET (OF. *bon[n]et*, Fr. *bonnet*, from Low Lat. *boneta*, from *bon[n]etus*, the stuff of

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which the article was made, possibly Hind. *bānāt*, woolen cloth, broadcloth). A covering for the head, distinguished from the *hat* (q.v.) by being brimless.

Since the distinction between bonnets, hats, and caps has, in all periods, been to a great extent arbitrary, the history of bonnets is of necessity involved in that of the head-covering in general, and especially the cap. Just as the hat is the direct descendant of the roomy *petasos* of the ancient Greeks, with its broad brim for protection from the sun, the bonnet, in its original significance, is a descendant of the *pileos*, the conical, close-fitting cap of the Greek soldier, seaman, and mechanic. It was made of cloth, leather, or felt, and resembled the modern fez. This same cap was worn by the Roman artisan. It differed from the modern Phrygian bonnet or liberty cap (q.v.) in not having the top bent or drooping forward. The *mitra* was a tall cap worn by the Persians and the neighboring nations during the Græco-Roman epoch. One form was alluded to as the Phrygian cap. Persons of dignity wore another style, which ended in an ornament, and frequently resembled our modern conventional crown. This cap was in general use in Western Asia from the time of the Assyrian Empire to the time of the Parthian wars against Rome. In this connection may be mentioned the 'bonnets' in Ex. xxix. 9, and Lev. viii. 13, the round mitres worn by ordinary Jewish priests as distinguished from the headdress like half an egg in shape, peculiar to the high priests. 'Mitre' in Ex. xxviii. 4, and 'diadem' in Ezek. xxi. 26, translate the same Hebrew word. A closely related headgear was the tiara-shaped cap worn by priests and married men and women. It is commonly supposed that the bishop's mitre and the tiara of the Pope are derived from the Asiatic headdresses.

The European bonnet of the Middle Ages was of cloth, silk, or velvet, according to the taste of the wearer, and varied greatly in shape at different periods. Among women it frequently adopted such grotesque proportions as the *hennin*, worn in the Fifteenth Century—an absurdly high bonnet, mounted on cardboard. In the Sixteenth Century, hats, too, began to be generally worn. The Scotch clung to their old bonnet, celebrated by stories and songs. The braid bonnet of the Lowland peasantry, broad, round, and flat in shape, overshadowing the face and neck, resembled the *bonnet Béarnais* or *béret Basque* of the south of France. It was dark blue in color, except the red tuft on the top. The fabric was of wool, without seam or lining, and exceedingly durable. From having been worn until comparatively recent times by small rural proprietors, it gave to the local notabilities the distinctive appellation of 'bonnet-lairds.' The Highlanders have long worn bonnets of the same fabric, but of different shape. The Balmoral is flat, and resembles the Lowland bonnet. The Glengarry rises to a point in front and is without any brim. The Glengarry was the undress fatigue-cap of the British infantry, but has now been superseded by what is known the 'field-cap,' provided with flaps to cover the ears. See COSTUME.

BONNET, bô'nâ', ALFRED MAXIMILIEN (1841—). A classical philologist, born in Frankfort-on-the-Main in 1841. He studied at Bonn, and became professor of the Latin language and literature at Montpellier. He is the author of *De Claudii Galeni Subfiguratione Empirica* (1872); *Le latin de Grégoire de Tours* (1890); *La philologie classique* (1892).

BONNET, CHARLES (1720-93). A Swiss naturalist and philosopher, born in Geneva. He was educated for the law, but devoted himself to science. A dissertation on aphids, in which is described for the first time parthenogenetic reproduction, procured for him, at the age of 20, the honor of being made corresponding member of the French Academy of Sciences, and in 1743 he was elected a Fellow of the Royal Society. In 1745 he published *Traité d'insectologie*, and in 1754 *Recherches sur l'usage des feuilles dans les plantes*. Failing eyesight compelled him to abandon investigation, and he devoted himself to philosophical speculation. He wrote *Considérations sur les corps organisés* (1762-68), in which he expounded the theory of *emboîtement*, or the preformation of germs; *Contemplation de la nature* (1764-65); *Palingénésie philosophique, ou idées sur l'état passé et sur l'état des êtres vivants; Recherches philosophique sur les preuves du Christianisme* (1773). Bonnet enjoyed a wide reputation and influence as a naturalist and philosopher; he originated the term 'evolution' to apply to the successive unfolding of preformed germs, a meaning quite different from its present one.

BONNET FLUKE, SHARK, etc. See FLUKE; SHARK, etc.

BONNETHEAD. A small shark of the genus Reniceps, as *Reniceps tiburo*, the shovel-head, related to the hammer-head, and frequenting warm seas.

BONNET-MONKEY. See MACAQUE.

BONNET-PIECE. A gold coin of James V. of Scotland, so called on account of the King's head being decorated with a bonnet instead of a crown, as was usual. James V. was the first Scottish sovereign who placed dates on his money, and the first who diminished the size of the gold coins by "increasing their thickness." The most remarkable are those commonly called the 'bonnet-pieces,' which were struck of native gold. In beauty and elegance of workmanship, they approach the Roman coins. These 'bonnet-pieces' are among the most valued curiosities of the antiquary.

BONNET ROUGE, bo-nâ' rōōzh. The Liberty Cap of the French Revolution. The name was also transferred to the revolutionists.

BONNEVAL, bŏn'vàl', CLAUDE ALEXANDRE, Count de (1675-1747). A French adventurer, also called Achmet Pasha. He was born of a noble family at Coussac, in Limousin, proved unmanageable at the Jesuit college, and was placed in the Royal Marine Corps in his thirteenth year. He was transferred to the Guards, and served with great distinction in Italy and the Netherlands under Catinat, Villeroi, and Luxembourg; but having behaved with great insolence to the Minister of War, he was condemned to death by a court-martial. He fled to Germany, where, upon the recommendation of Prince Eugene, he obtained employment in the Austrian service. He now bore arms against his native country, was present at the battle of Malplaquet, distinguished himself by many daring exploits, was raised to the rank of lieutenant

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field-marshal, and fought under Prince Eugene in the war between Turkey and Austria, at Peterwardein and Belgrade. At Vienna, after the peace of Passarowitz, he made himself very disagreeable to the Prince, and was therefore sent, in 1723, as master-general of ordnance, to the Netherlands, where he soon got into a quarrel with the Governor, was brought to trial, and condemned to death. The Emperor commuted the sentence to one year's imprisonment and banishment from German soil. Bonneval went to Constantinople, where he was cordially welcomed, became a Mohammedan, taking the name of Achmet, and was made a pasha of three tails. He was employed in organizing the Turkish artillery and achieved successes as general of a division of 20,000 men in the war of the Porte with Russia. For his services the Sultan appointed him Governor of Chios; but his own imprudence and the envy of others caused his removal from this office. He died in Constantinople. He vainly attempted to stir up the Sultan against Austria. His remarkable energy and great military talents were offset by a boorish and quarrelsome disposition, which always made him enemies on every side. Consult: *Memoirs of the Bashaw Count Bonneval* (London, 1750); Vandal, *Le Pacha Bonneval* (Paris, 1885).

BONNEVILLE, bŏn'vĭl, LAKE. See LAKE.

BONNEVILLE, BENJAMIN L. E. (1795-1878). An American army engineer and explorer. He was born in France; emigrated to the United States, and graduated at West Point. In 1820 he was constructing a military road in Mississippi, and in 1831 started on an exploring expedition to the Rocky Mountains and was not heard from for several years. He served in the Florida and Mexican wars, rising to the grade of colonel, and in 1861 was retired on account of disability, but served during the Civil War as superintendent of the recruiting service in Missouri, and was raised to the rank of brigadier-general in 1865. Washington Irving edited and amplified the *Adventures of Captain Bonneville, U.S.A., in the Rocky Mountains and the Far West* (1837).

BONNEVILLE, bŏn'vĕl', NICOLAS DE (1760-1828). A French author and publicist, born in Evreux. Upon the outbreak of the Revolution he was appointed an elector and a district president of Paris, and devised, it is said, the idea of the National Guard. He was the founder of a society known as the Cercle Social, from whose press there appeared several patriotic journals, such as the *Bouche de Fer*, the *Chronique du Jour*, and the *Bien-Informé*. He was imprisoned as a Girondist in 1793, and also suffered persecution under the Empire for his advanced views. Among his works are: *Nouveau théâtre allemand* (1782); *Histoire de l'Europe moderne* (1789-92); *Le vieux tribune* (1791) and *Poésies* (1798).

BON'NEY, CHARLES CARROLL (1831—). An American lawyer, president of the World's Congress Auxiliary of the Columbian Exposition. He was born at Hamilton, N. Y.; studied at Colgate University, and was a teacher in 1848-52. He was admitted to the Illinois bar in 1852, and from 1890 to 1893 was president of the International Law and Order League. He organized and was president of the World's Congresses, including the Parliament of Religions, held in connection with the exposition at Chicago in 1893.

BONNEY, THOMAS GEORGE (1833—). An English geologist, born at Rugeley. He studied at Saint John's College, Cambridge, where he was tutor from 1868 until 1876. Subsequently he became professor of geology at the University of London. In 1884 he was Hulsean lecturer, and in 1892 Rede lecturer, at Cambridge. He was president of the Geological Society of London in 1884-86, and in 1899 was elected vice-president of the Royal Society. His publications include *The Alpine Regions* (1868); *Charles Lyell and Modern Geology* (1895); and *Volcanoes* (1898), besides four volumes of sermons.

BON'NIBEL (Fr. *bonne et belle*, good and beautiful). A stock name employed for the heroine in the old pastorals.

BONNIE BLUE FLAG, THE. A popular Confederate song, the authorship of which is disputed. It has been attributed to Henry McCarthy and to Annie C. Ketchum. The song was first given in 1861 at the Varieties Theatre in New Orleans.

BONNIER, bô'nyā', GASTON (1853—). A French botanist, born in Paris. He studied at the Normal School there, and was appointed a professor at the Normal School, and subsequently (1887) at the Sorbonne. He founded the laboratory for botanical researches at the Sorbonne, and the laboratory for the study of vegetable biology at Fontainebleau. The *Revue Générale de Botanique* is edited by him, and he has published useful *Floræ—Les plantes des champs et des bois: excursions botaniques* (1887), and other works.

BONNIVARD, bô'nē'vär', FRANÇOIS DE (1496-c.1570). A Swiss patriot, Byron's "Prisoner of Chillon." Educated at Turin, he became in 1510 prior to Saint Victor, near Geneva, and aided the Genevese against the Duke of Savoy, who captured and imprisoned him for two years. Later he was taken by robbers and offered to the Duke, who imprisoned him from 1530 to 1536 at Chillon. The Genevese and Bernese liberated him. He returned to Geneva, where he was rewarded with a pension, and died in honor. His *Chroniques de Genève*, written at municipal request, were published there in 1831. Consult Gribble, *Lake Geneva and Its Literary Landmarks* (1901).

BON'NYCLAB'BER. An old provincial name for milk that in the process of souring has become thick and clotted. The word is a compound of Ir. *bainne*, milk, and *claba*, thick mud. The word *clabber* alone is sometimes used in the same sense as the compound.

BONO, bō'nô, **BON**, bōn, or **BUONO**, bwō'nô. A family of Venetian architects and sculptors. Its founder, GIOVANNI BONO (1400?-42?), and his son BARTOLOMMEO BONO (1421-42), were the greatest artists of the late Gothic period in Venice, the authors of the famous Palace Ca' d'Oro (1421) and the Porta della Carta (1438), between the Doge's Palace and Saint Mark's. See VENETIAN ART.

BONOMI, bô-nō'mē, GIUSEPPE (1739-1808). An Italian architect, who in 1767 settled in England. He was well known in Italy, having been appointed an architect of Saint Peter's, and in England aided greatly in the revival of Greek

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architecture. His most celebrated work was a villa erected for the Duke of Argyle at Roseneath, Dumbartonshire. He was elected an associate of the Royal Academy in 1789, and his subsequent failing to obtain election to full membership was the cause of the withdrawal of Reynolds from the presidency. Between 1783 and 1806 he exhibited numerous drawings at the Academy.

BONONCINI, bō'nŏn-chē'nē, or **BUONONCINI,** bwō'nŏn-chē'nē, GIOVANNI BATTISTA (1660-1750). An Italian operatic composer and violoncellist. He was a pupil of his father, Giovanni Maria Bononcini, and of Paolo Colonna. He became violoncellist to the Court at Vienna in 1691. In 1716 he visited London, where he soon acquired a popularity which made him a formidable rival of Handel, the respective merits of the two musicians being for a time hotly contested. In 1731 it was discovered that he had plagiarized an anthem by Antonio Lotti, and soon afterwards he left London in disgrace, and went to Paris, where he became interested in alchemy, in the pursuit of which he impoverished himself. He was invited to Vienna in 1748 to compose the festival music in celebration of the Peace of Aix-la-Chapelle. He died in Venice at the age of 90, and is said to have preserved his power of productivity unimpaired to the last. His principal compositions include the operas *Tullo Ostilio* (Rome, 1694); *La fede pubblica* (Vienna, 1699); *Polifemo* (Berlin, 1703); *Astarte* (London, 1720); the *Funeral Anthem for the Duke of Marlborough* (ib. 1722); the oratorio *Il Giosuè*, also several symphonies, and some chamber music.

BONONCINI, or **BUONONCINI,** GIOVANNI MARIA (1640-78). An Italian composer. He was born in Modena, and studied in Bologna. He early entered the service of the Duke of Modena, and became *maestro di capella* of San Giovanni in Monti. He wrote a great number of instrumental and vocal compositions, and a theoretical work entitled *Musico prattico* (1773).

BONONE, bō-nō'nā, CARLO (1569-1632). An Italian painter, born in Ferrara. He studied under Giuseppe Mazzuoli, and made careful examination of the works of the Caracci in Bologna and Rome, and of those of Paolo Veronese and Correggio in Venice and Parma. His smaller paintings are in the style of the Caracci, his larger in that of Veronese. Some of the most prominent painters of Ferrara were his pupils. His works, many of which are in the churches of Ferrara, include "Patriarchs and Prophets" and "Arisen Christ with Saints."

BONPLAND, bŏn'plăn', AIMÉ JACQUES ALEXANDRE—his real name was Goujand—(1773-1858). An eminent French botanist. He studied medicine and botany in Paris, and in 1799 accompanied Alexander von Humboldt to America, and with him traveled extensively in Mexico and the Andes (1799-1804), where Bonpland collected 6000 new species of plants. After his return he was appointed director of the gardens at Navarre and Malmaison in 1804, and published several splendid and valuable botanical works, such as *Plantes équinoxiales récueillies au Mexique* (2 vols., Paris, 1808-16); *Monographie des mélastomacées* (2 vols., Paris, 1809-16); and *Description des plantes rares cultivées à Navarre et à Malmaison* (Paris, 1813-17). He went to Buenos Ayres in 1816, with a collection of European plants and fruit-trees, and was there appointed professor of natural sciences. In 1821 he undertook an expedition of scientific discovery up the Paraña, with the view of prosecuting his investigations to the Andes, across the Gran Chaco Desert; but Dr. Francia, then Dictator of Paraguay, believing him to be a spy, arrested him, and kept him prisoner for eight years. In 1829 Bonpland obtained his liberty, went to Brazil, and resided at Santa Borja till 1850. He then removed to Corrientes, where he practiced medicine till his death. His remarks on the herbarium collected in his travels with Humboldt have been published by Kunth in his *Nova Genera et Species Plantarum* (12 vols., Paris, 1815-25). For his biography, consult Brunel (Paris, 1872).

BONSTETTEN, bŏn'stĕt'en, CHARLES VICTOR DE (1745-1832). A Swiss author. He was born in Bern, and studied in Leyden, Cambridge, and Paris. He was a member of the Grand Council of Bern in 1775, and subsequently bailiff at Sarnen and Nyon. He became superior judge at Lugano; but in 1796, to escape the Revolution, withdrew to Italy, and thence to Denmark, where he remained until 1802. His works include: *Kleine Schriften* (1799-1801); *Voyage sur la scène des dix derniers livres de l'Énéide* (1895); *L'homme du Midi et l'homme du Nord* (1824); and *Souvenirs écrits en 1831* (1833). For his life, consult Morell (Winterthur, 1861).

BONTEBOK, bŏn'tē-bŏk. One of the hartbeests. See HARTBEEST.

BONTEMPS, bŏn'tăn', ROGER. The pen-name used by Roger de Collerye, a jolly Parisian of the Fifteenth Century. The name has passed into the language for a 'good fellow.'

BON TON, *Fr. pron.* bŏn' tŏn' (Fr., good tone or manner). A comedy by Burgoyne (1760), altered and produced by Garrick (1775) with a sub-title *High Life Above Stairs.* It was designed as a satire against the contemporary introduction of French customs. Lord Menekin affects an ardent passion for Miss Tittup; Lady Menekin pretends to be in love with Colonel Tivy. Miss Tittup and Colonel Tivy really love each other, and are engaged, but do not feel it good form to confess to it.

BONTOUX, bŏn'tōō', EUGÈNE (1824—). A French financier. He studied at the Ecole Polytechnique, and was by profession an engineer, but subsequently was appointed general director of the Southern Railway of Austria. With the support of the Rothschilds he made large speculations. Later, having lost much of his fortune and quarreled with the Rothschilds, he founded in Paris, in 1878, chiefly with the aid of clerical and Legitimist capital, the Union Générale, whose success was marked and extensive. A severe decline in prices in 1882 bankrupted the Union, whose projector escaped five years' imprisonment by flight. He published *L'Union générale, sa vie, sa mort, son programme* (1888).

BONTUKU, bŏn-tōō'kōō, or BONDUKU. An important commercial town in French Sudan, situated close to the English boundary. It lies at an altitude of nearly 800 feet, on the caravan route connecting Kong and Timbuktu with the Western Sudan, and has a large trade in gold-

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dust, salt, and cotton goods. The houses have flat roofs, and are inclosed by high clay walls interspersed with buttresses. The architecture suggests a higher state of civilization than is found in the surrounding country. The population is estimated at from 7000 to 8000, and is chiefly immigrant.

BONVALOT, bôn'vȧ'lō', Pierre Gabriel (1853—). A French traveler and explorer. He was born at Epagne (Aube), studied at the lyceum of Troyes, in 1880 accompanied Ujfalvy on a journey of exploration to the interior of Asia, and in 1886-87, accompanied by G. Capus and the painter Pepin, undertook a second journey thither. In 1889-90, with Prince Henri d'Orleans (q.v.), he traversed Asia from Siberia to Tonkin. He was sent in 1897 on a Government mission to Antoto, Abyssinia. His principal works include: *De Moscou en Bactriane* (1884); *Du Caucase aux Indes à travers le Pamir* (1888); *De Paris au Tonkin* (1892); and *L'Asie inconnue* (1896).

BO'NUS (Lat. *bonus*, good). A special allowance beyond what is formally due. It is applied (a) to a special dividend. If the previous dividend has been 4 per cent. on the capital, and if the profits of the current year admit of 5 per cent., a formal dividend of that amount would commit the company to a like dividend in future; and to prevent such a precedent, 4 per cent. is declared, and a bonus of 1 per cent. It is also used (b) to designate the inducement offered to security-holders to part with their securities in exchange for others. Thus, in industrial combinations, it is not infrequent that stockholders of the older corporations receive, in addition to the nominal value of their holdings in the new securities, a bonus, either in cash or in securities of the new organization. The term also designates (c) the payment to the Government for the privileges which the act of incorporation confers upon a company.

BONVIN, bôn'văn', François Saint- (1817-87). A French painter, born at Vaugirard. He was self-instructed, and painted chiefly genre pictures on motives derived from the workaday phases of humble life. His drawing is true and his color harmonious. He also executed several effective etchings. His pictures include the following: "Charity" (1852); "Regimental School" (1853); "The Gossip" (1859); "Grandmother's Coffee" (1866); "Pious Persons Distributing Alms" (1867); "Morning in the Pasture" (1870); "The Pig" (1875); and "Corner in a Church" (1880).

BONY PIKE. A gar-pike (*Lepidosteus*). See Gar.

BONZE, bŏn'zē. A word corrupted from the Japanese *bo-dzu*, which in southwestern Japan is nasalized and softened. Correctly applied in general to members of the Buddhist fraternities, by natives, it is used also by foreigners for the priests and monks in other countries of Asia. The Chinese characters *fu-tu*, in the Sixth Century, spelled Buddh, but crossing the water the spoken word became 'bonze.' The term is general, referring to the Buddhist religious members of the community, rather than to the rank or priestly character of one who professes the Buddhist religion, the special term for priest being *osho* or *so*. Popularly, it has especial reference to the shaven head, the old term being also applied to former retainers of the daimios.

BOOBY. Any of various of the lesser and more tropical species of gannets (genus Sulu). The name is said by Newton (*Dictionary of Birds*, London, 1896, p. 48) to be a corruption of the Portuguese *bobo*, a fool, derived from the Latin *balbus*, stuttering or inarticulate; and to have been "applied, most likely by our [British] seamen, originally, to certain birds from their stupidity in alighting upon ships and allowing themselves to be taken easily by the hand," instances of which have been mentioned in many accounts of early voyages. There is no reason to suppose that these birds are any more stupid than other sea-fowl little accustomed to man. All boobies differ from gannets in having the whole lower jaw, chin, and throat naked. Several species are known, one confined to the Peruvian coast, and the others ranging throughout the warmer seas of the whole world, and coming north on American shores to Georgia and Lower California. Their habits are those of the gannet (q.v.), with the important exception that they make their nests, as a rule, on bushes and trees instead of on rocks. The site is always near the seashore. It is a rude platform of sticks and dry seaweed, and contains one or two eggs, "chalk-white superficially, but beneath the calcareous crust pale greenish-blue." The commonest and typical species is *Sula sula*, which is dark sooty-brown (often tawny), with the naked skin of the face and throat yellowish and the feet dull-green. The blue-faced booby (*Sula cyanops*) is white, with wings and tail sooty-brown, the naked skin about the face and throat bluish, and the feet reddish. The red-footed booby (*Sula piscator*) is yellowish-white, with the wing-quills slate-colored and the feet red.

BOOBY, Lady. The suggestive name of a character in *Joseph Andrews*, a novel by Fielding. Attempting the virtue of the title character, her footman, and failing, she turns him out.

BOOBY ISLAND. A level rock in Torres Strait, in latitude 10° 36′ S. and longitude 141° 53′ E., 3 feet in height, and one-fourth of a mile in diameter. As it is highly dangerous to navigators, and destitute of natural resources, it is regularly supplied with provisions and water by passing vessels, for the benefit of such as may be cast ashore on it.

BOOG, bōōg. See Bug.

BOOK. The aim of the first scribes in the choice of the material for their work was to give durable form to the production. Accordingly, the earliest inscriptions which have been preserved were placed on stone or baked brick or metal, rather than a more flexible but more perishable material. The Ten Commandments, for instance, were written on slabs of stone. Josephus records that the columns on which the children of Seth placed the records of their inventions were of stone and brick. The Laws of Solon (about 594 B.C.) were inscribed on wooden planks. The earliest productions answering to our modern books of which we have any record were the tiles covered with inscriptions in the soft clay by the Chaldean scribes, and rendered permanent by being baked in ovens. The excavations carried on in Lower Mesopotamia (1895-1901) by Dr. John P. Peters and others have

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brought to light, from the ruins of the Temple of Nippur, tablets believed to have been produced about B.C. 6000. The text inscribed on these is, with few exceptions, devoted to the hymns and invocations used in the temple services. The larger of these Chaldean tablets are flat, and measure 9 inches by 6½ inches; the smaller are slightly convex, and in some cases are not more than 1 inch long, bearing but one or two lines of cuneiform characters. These characters are impressed on the soft clay by a little iron rod (the equivalent of the Roman stylus), not pointed, but triangular, at the end. The impression bears, therefore, the shape of a wedge. In the literature of Egypt, the earliest examples (apart from certain inscriptions on the tombs) are copies of what was known as the *Book of the Dead.* The text of this varied with the different copies, as these were prepared for placing in the tombs or in the cases with the mummies, and while all contained invocations to the deities, together with prayers and psalms, differed in including special records referring to the life of the deceased and to his personal expectations for the world to come. The Chinese speak of their own literature as having originated many thousand years back; but its earliest known work of which any copies have been preserved dates from B.C. 1150, or some 200 years earlier than the generally accepted date of the Homeric poems. The book in question bears the title *Y-king*, the Book of the Metamorphoses or Developments. The material next in importance to the baked clay, and probably also next in point of antiquity, was the skin of goats. In the earlier form in which this was utilized by the Hebrews, Greeks, and others, the skin was dressed only on one side, and did not present any thoroughly finished surface. These dressed skins were called by the Greeks *diphtherai*, and writings upon them came to be known by the same name. Ctesias speaks of the *diphtherai basilikai*, royal books (or writings or documents) of the Persians, and Herodotus says that such skins were used in the earlier ages even in Egypt. It was, however, not until the production of parchment (q.v.) (*membrana* or *pergamena*), that the value of skins for literary purposes began to be properly understood; and even parchment made its way but slowly among writers in competition with the long-established papyrus, which it was, however, destined to outlast for many centuries. The name parchment (*pergamena*) is derived from the city of Pergamum, where, according to the tradition, it was first prepared under the direction of King Eumenes II. about B.C. 190.

It is probable that parchment had actually been produced considerably before this date; but great impetus was undoubtedly given to its use and its manufacture was improved, owing to the embargo placed by the Egyptian King, Ptolemy Philadelphus, on the exportation from Egypt of papyrus. The papyrus is a species of reed which in ancient times abounded on the banks of the Nile. According to Wilkinson, the plant has now entirely disappeared from Egypt, recalling the prophecy of Isaiah (xix. 7): "The paper reeds by the brooks, by the mouth of the brooks, . . . shall wither, shall be driven away and be no more." The material used from the papyrus-plant was the pith of the stem, which was rolled out into a tissue. Pliny speaks of the layers of the pith being soaked in water of the Nile and woven into a sheet (*plagula* or net). An evidence of the early use, in various countries, of vegetable tissue for writing is found in the etymology of Greek and Latin names for books (βίβλος, *liber*, *codex*), all of which refer originally to parts of trees or reeds. The writing on the sheet of papyrus was done with a split reed; for ink, different colored pigments were utilized. The oldest Egyptian papyrus known to have been preserved has been assigned to a date about B.C. 2000, or 4000 years later than the baked tiles of Chaldea. The papyrus book, whether Egyptian, Greek, or Roman, was arranged very much like a modern mounted map. The length of the material, written on one side only, was wound upon a wooden roller. Such rolls were found often 20, 30, or even 40 yards long. Herodotus tells us of a copy of the *Odyssey* written on one such roll. With the increasing scarcity of papyrus, the improved parchment came into general use, superseding papyrus by the beginning of the Seventh Century. But from the Fourth Century B.C. to the close of the Sixth Century A.D., by far the larger proportion of the literature of the world was recorded on sheets of papyrus. The perishability of the papyrus is responsible for the loss of a very large proportion of this literature of antiquity. Bearing in mind the fragile character of the material itself and its liability to destruction through damp, dry-rot, mice, and insects, and recalling also that the mere handling by the most careful readers of a papyrus roll destroyed in a very brief period the outside sheets (that is to say, the beginning and the end of the manuscript), one is surprised, not that the literature of Greece and Rome has come to us in such fragmentary condition, but that so many important works have been preserved.

When there came to be, as in Rome, in the First and Second centuries A.D., a continued and increasing demand for copies of a work, the booksellers organized methods for speedier multiplication of copies than had been possible when each copy was produced by a single scribe. By using readers who dictated at one time to a group of from a dozen to fifty scribes, they secured a very considerable speed in the multiplication of copies. Nearly all of these scribes were slaves, but they were well-educated slaves. Accuracy was, however, sacrificed to speed; there was often no proper collation, and many of the deficiencies in the texts of classical works are to be charged to the carelessness of these copyists. The scribes who prepared the manuscripts were known as *librarii*. This name came afterwards to be applied to the booksellers through whom the manifolded copies were sold. The smaller dealers had themselves given the manual labor for the production of their wares; the larger *librarii* hired for the purpose the work of the slaves.

With the institution of the first Christian monasteries, with their *scriptoria* or writing-rooms, the business of book-making takes on a new phase. The material is parchment. The stylus is developed into a reed pen. The scribes are no longer slaves working under hire, or booksellers preparing copies for sale, but monks manifolding sacred writings for the glory of God. We have thus at once a higher standard of work, both for accuracy and for beauty. The classic texts that exist to-day have come down to us in these parchment copies prepared by the monastic copyists. The texts from which the first of these

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scribes worked were the papyrus sheets, which shortly thereafter disappeared altogether. Fortunately for the literature of the world, the labor of these earlier generations of monks was not confined exclusively to the duplication of the Scripture or of the sermons of the Fathers. At the instance of Cassiodorus, who in 567 organized in his own monastery at Vivarium the first of these *scriptoria*, a portion of the working time was given to selections of the classics, though the books which were multiplied most frequently were the Scriptures in the Latin version of Saint Jerome, Saint Augustine's *City of God*, and the *Consolations of Philosophy*, by Boëthius. In fact, it was to the monastic scribes that the first printers owed the existence of the classical texts from which their own work was done. See BENEDICTINE.

The next period in the making of books comes with the organization of the oldest universities, Bologna and Paris, all of which date, as far as their effective work is concerned, from the beginning of the Thirteenth Century. In these universities the making of books became part of the educational work. The book-makers, that is to say, the scribes who had charge of the multiplication of the texts, were appointed by the university authorities. They were held strictly responsible for the accuracy of their manuscripts, which were to be used as texts for the lecturers and for their students. The first scholarly editorial work in the collation and correction of the classic texts dates from this period. The name given to the officials who were charged with the duty of providing texts for the universities was *stationarii*. The work of these men comprised, in addition to the preparation of the texts, the renting at specified rates of the manuscripts so prepared to the students and instructors. During the earlier years of book-making in the universities the sale of manuscripts by the *stationarii* was not permitted.

Paper (q.v.) was introduced into Europe about the beginning of the Tenth Century. This earliest paper (*charta bombacina*) was made from cotton. Paper made of linen first came into use, according to Mabillon, in the Twelfth Century, although Montfaucon asserts that no specimens have been identified earlier than 1270.

According to tradition, the University of Bologna owed its foundation to Charlemagne. This connection is now held to be but a legend. It is true, however, that before the close of the Eighth Century Charlemagne rendered an important service to the making of books. In 782 the monk Alcuin was called by Charlemagne from his home monastery in York to the Court at Tours. Alcuin established a series of royal schools. In these schools was instituted a uniform system of script, which was prescribed for the educational and for the official documents of the realm. Fortunately for the work of the latter scribes and for the interests of literature, Alcuin selected for his standard of form not the Gothic, but the Latin script. It was this script of Alcuin's which was accepted as the model for the *scriptoria* of the monasteries, and later for the working-rooms of the universities. It was this same script, as developed through the centuries of book-writing in the universities, that became the model for the type-founders after 1472, who shaped the fonts of the Latin alphabets; that is, of all the Western alphabets other than the Gothic or German.

It was the practice of the manuscript copyists to place at the close of the text information in regard to the date and place of production, and occasionally, although by no means uniformly, the name of the writer. Such a record at the close of the work is known as a 'colophon.' Even after the introduction of printing, we find in a number of books of the last half of the Fifteenth Century such records presented at the end of the volume in a colophon. It is an inconvenient peculiarity, however, of a large number of the earlier printed books that they fail to present either the name of the printer or the date of their production.

An instance of the price of a manuscript work of the Ninth Century is given in the life of King Alfred, who bought in 880 from Ceolfried, Bishop of Wearmouth, a work on cosmography, for which he paid in land sufficient to support eight families. It is not safe, however, to deduce an average market value for written books from this or from similar instances of exceptional prices paid for manuscripts. It happened not infrequently that the manuscript contained, in addition to the work of the scribe, designs and illuminations contributed by artists who may have given to this additional labor years of time; and certain manuscripts were inclosed in very elaborate and costly covers. Finally, in case the manuscript happened to be the only copy of that particular text that was within reach, it would possess what might be called a competition value, irrespective of the actual cost of the labor of its production. If the owner forbade any copying, its unique value would remain. We have, therefore, instances through the manuscript period of single works being purchased at exceptional prices, while other works, which called for no less labor on the part of the scribes, could be secured at moderate cost. For additional information in regard to books produced in the manuscript period, see PALEOGRAPHY.

With the invention of printing we come to what may be called the modern period of the making of books. The press of Gutenberg was brought to completion in Mainz by the year 1450. For a century prior to this date, books of a special character, made up mainly of pictures with an inconsiderable interpolation of text, had been printed from blocks of solid wood, and later of zinc. These books were chiefly devotional in character. The printing of these block books is termed *xylography*, as contrasted with the printing from movable type, which is classed as *typography*. It is certain that the more important part of Gutenberg's invention was not the mechanism of his press, which differed in detail rather than in principle from the presses previously in use, but the use of movable type. It may be recalled here that movable wooden type had been utilized by the Chinese as early as the beginning of the Eleventh Century. The first work produced by the movable metal type of Gutenberg was a Latin Bible. Prior to the invention of the printing-press, the book had been something with which the scholarly class (chiefly the clerical or ecclesiastical class) alone was concerned. With the distribution of printed copies, first of religious works, then editions of the classics, later writings addressed directly to the understanding of the general public, the

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book becomes an influence for directing public opinion. It is through the printed sheet that the thought of a Luther or a Calvin becomes a means of revolutionizing the opinions of a large proportion of his generation.

The chief difference in the external appearance of books since the Sixteenth Century is the general abandonment of the large sizes which were common in the days when books were not supposed to appeal to such a large and varied class as at present. The folio and quarto have almost entirely gone out of use, except for very elaborate and costly books. The technical names of the various sizes are based upon the number of times the old-fashioned large sheet of paper was folded for the binding. The sheet folded once, to make two leaves or four pages, constitutes a folio; folded into four leaves, a quarto; into eight, an octavo; into twelve, a duodecimo, and so on through the smaller sizes. It is usual to write the Arabic numeral with the Latin termination, as 4to, 8vo, 16mo, etc. The old sizes are not so strictly followed nowadays, though the names are retained for convenience.

Consult: Birt, *Das antike Buchwesen in seinem Verhältnis zur Litteratur* (Berlin, 1882); Arnett, *An Inquiry into the Nature and Form of the Books of the Ancients* (London, 1837); Putnam, *Authors and Their Public in Ancient Times* (New York, 1893); Putnam, *Books and Their Makers in the Middle Ages* (New York, 1896); Madan, *Books in Manuscript* (London, 1893); Duff, *Early Printed Books*, (London, 1893); Pollard, *Early Illustrated Books* (London, 1893); and the authorities referred to under the titles given below. See also PRINTING; BOOKSELLING; BIBLIOGRAPHY; BOOKBINDING; LITERARY PROPERTY.

BOOKBINDING. The history of bookbinding is chiefly the history of the ornamentation of book-covers. The mechanical work of sewing and covering a book, described below, might indeed be studied chronologically as regards the changes in the processes employed; but this is of little general interest. When strips of vellum were replaced by cords at the back of the book, though perhaps discoverable, is a less attractive question than that as to the place and time when gold tooling was introduced. Thus in the Twelfth Century there appear in England the earliest stamped leather bindings, and for our present purpose this is the beginning of the history of the art. The workmen of that time were familiar with the arts of softening leather and then shaping it into the most complicated forms. Under the name of *cuir-bouilli*, corrupted in England into quirboily and the like, the material was used for much of the war equipment of man and horse, as well as for decorative arts in peace. It was, therefore, easy to take the further step of drawing the soft leather tight on a thin oak board, impressing upon it stamps most commonly of wood and engraved in relief. In this way designs in the taste of the epoch, Romanesque or semi-Byzantine scrolls and conventional birds, are found stamped in leather. In the Thirteenth Century the design becomes more notably Gothic; in the Fourteenth Century the emblems of lions, fleurs-de-lys, roses, castles, and all the other devices of heraldry, divide the field with religious emblems. All this is in what is called 'blind' tooling; that is to say, in patterns impressed but not colored nor gilded.

Gold tooling seems to have come into Europe from the East, probably in the Fifteenth Century. The custom of coloring the impressed pattern seems to have been introduced about the same time. The art of inlaying was the natural result of this taste for colored patterns, and is probably of the Sixteenth Century. It was for many years chiefly confined to Italy, where it was used with the greatest freedom, the color patterns being partly in inlaid leather, partly in painting, and everywhere bordered and touched with gold.

According to tradition, oak boards were first abandoned in favor of paper by the workmen who covered the books of the famous printer Aldus of Venice, in the Sixteenth Century. Previous to this time even small books had their stiff covers a quarter of an inch thick, and often beveled to a sharp edge to disguise this disproportionate thickness. The 'half-binding' of the time was, then, that with leather back, this cover extending not more than an inch over the oak boards, which were otherwise exposed with no decorative effect except the grain in the wood. The cheaper kind of full binding was of brown leather stamped sometimes with separate though not very small tools and with letters put on by separate type, so as to form inscriptions, and sometimes with larger stamps, as where a Christ bearing His Cross and a David with his harp are on the two flats of a cover, dated 1568, each stamp measuring $1\frac{3}{8} \times 2\frac{5}{8}$ inches; these and the inscriptions around being gilded in a singular way by a process of lacquering, probably Oriental in its origin. Vellum, parchment, and white pigskin were used, replacing the brown leather, and these light-colored materials were often covered all over with minute patterns, in which apparently metal stamps were freely used.

Jean Grolier de Servier was treasurer of Francis I., King of France, and for him were prepared bindings of great richness and beauty. It appears that the volumes of a library, large for its epoch, were bound for him in this sumptuous way, the characteristic ornamentation being interlacing bands, dark, and edged with gold upon a lighter ground, or scrolls of gold lines only; the name of the book being lettered in the centre panel of one or both of the sides, and the familiar motto, *Portio mea domine in terra viventium*, alternating with or accompanying the phrase, *Io. Grolierii et amicorum* "[the property] of John Grolier and his friends." The decoration and the friendly legend were both rather closely imitated by Maioli, an Italian, of whom but little is known.

In the Seventeenth Century the use of coats of arms fully displayed in gold, and occasionally in all the colors of the different bearings, became the most common adornment, though indeed such ornamentation dates from an earlier epoch. The tendency of design in the Seventeenth and Eighteenth centuries was away from polychromatic effects and toward insistence upon the beauty of the grained leather set off by the slightly impressed points and lines of gold. It is during the last quarter of the Nineteenth Century that effects of color, generally procured by means of inlay, have been restored to favor.

Metal mountings of all sorts are adjuncts whose principal object is dignity and sumptuousness. When books are very heavy and very precious, clasps have their utility, and bosses, four or five on each side, keep the leather and its

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ornamentation from being rubbed. Still, however, these mountings, like the far more elaborate covers of wrought silver-gilt set with enameled plaques and *cabochon* jewels, are chiefly ornamental in their purpose. Europe has never made so great a use as might have been expected of binding in rich stuffs beautiful in themselves.

The term bookbinding should properly be confined to the process of covering a folded and sewed book by stiff side-pieces of paper, board, or wood, which are secured to the package of folded leaves by flexible strips running across it at the back; which side-pieces are afterwards covered by material such as leather of some kind, cloth, or paper, pasted or glued to the stiff sides and to the back. The mounting of a book which is issued in a roll like the Roman *volumen*, or the Japanese scroll of similar character, is hardly bookbinding, although the very delicate use of decorative paper and rich stuffs, and the mounting of the scroll upon a cylindrical roller with ivory or other knobs at the ends, may provide the medium for much decorative treatment; and the modern so-called binding in pasteboard covered by muslin or silk and issued in large quantities by publishers should not be called bookbinding at all. For this the entirely appropriate name 'casing' may be used.

Considering now the art of binding as it is commonly understood, and as it has been practiced in Europe since the Fifteenth Century, the first process is collating, that is to say, examining the book to see if it is complete. In close connection with this is, of course, the folding of the sheets, if they have not been folded, or the pulling of the book to pieces if it has been bound or cased or stitched before. In the course of this preparation all plates or maps that have been put in with glue or paste are soaked off and their folding or placing considered with a view to the new binding. The sheets to be folded are indicated by special marks called 'signatures.' These are the letters such as A, A_2, and so on through the alphabet, which one sees at the bottom of some pages in almost any book. The folding of the sheets is the important matter, but it can never be neatly done unless the sheets have been so printed that the letterpress on one side comes exactly over that on the opposite side. Other sheets, similarly folded, but of plain paper, unprinted, are added at beginning and end for 'end-papers' or 'fly-leaves.'

The sheets once folded have to be sewn, but before the sewing is done the plates which are 'guarded,' or mounted upon guards (French, *onglets*), must be set into their places. Also before the sewing, the edges may be marbled or gilded or painted or sprinkled. It is to be noted that if the gilding is to be very effective it must be done on the rounded front edge, the leaves being deliberately hammered back until they reach the curve intended to be given to the book. This has to be done after the sewing; but if it is desired to avoid the look of a solid, smooth surface, and to let the leaves show individually at the edge, the gilding or coloring had better be done first. After the sewing is done the leaves may be considered as a solid block, and sometimes landscapes and the like are painted on the edges, which are afterwards gilded; the picture showing only when the mass of leaves is bent or rolled. Sometimes, too, the smooth surfaces made by the edges are stamped before gilding, producing impressed patterns.

The leaves of the book are secured together by sewing either to cords or tapes or slips of vellum; and these are, in modern practice, often let into the book by means of a saw-cut carefully made across the whole pile of sheets. This is not conducive to first-rate binding. It is far better to let the bands of cords or tape project from the back, and then to let the covering leather adapt itself to these. This, indeed, is the origin of those raised bands which are common on the backs of leather-bound books; but the modern custom leads to the making of wholly false bands, which have nothing to do with the actual sewing of the book. The projecting ends of the cords or strips are the means of securing the whole back to its covers, and therefore their length and the treatment of them is of extreme importance. If cord is used, it is raveled or frayed at the two ends in such a way that it will afford a good opportunity for glueing to the covers.

When the sewing is done and the cords are prepared for the covers, what are called the head-bands are put in, the only purpose of which is to save the top edge of the binding a little when the book is tilted by one finger from the shelf where it stands. The ideal way of putting this in is to sew the sheets to them as well as to the other bands, and at the same time; but in modern work they are generally additions intended rather for show than for utility.

The covering of the book is done by simply glueing or pasting the material to be used upon the boards of the sides and upon the back. There is, however, this difference between different kinds of back. Thus, the hollow back, so called, which allows the mass of folded sheets forming the book proper to leave the back and to hinge itself at any point, while the back remains independent and rounded out with an open space between it and the book, is made by a piece of pasteboard put in between so that the leather or silk of the cover is glued to it. The 'fast back' or 'tight back' is made by glueing the covering directly to the back-folded edges of the sheets. As this covering material is added to the completely made book, to the stiff covers and the back after they are put together, it is evident that a great deal of care must be used in stretching it to cover the bands, the corners, and the edge where it is turned under and has its edges covered by the lining paper or *doublure*. This doublure is commonly a piece of marbled or colored and glazed paper, half of which is pasted to the inside of the cover, while the other half forms an additional end-paper; but sometimes the cover is lined with a piece of leather.

Finally, the book is ornamented by stamping or tooling. These terms are used generally to imply, in the one case, large plates from which a stamp is taken covering the whole or a large part of the cover at one impression, while tooling is the putting on of the impressed or gilded lines, dots, leaves, and the like, separately, one by one, with a number of tools, the impressions of which are combined together so as to produce the patterns desired. The French term *fer* (iron) is used for one of these tools; hence the phrase *à petits fers*, meaning that the ornamentation is applied by hand, with little tools, one by one, making separate points, short bars, single leaves or flowers, which are combined in

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patterns. Rollers are used, by means of which indefinitely long lines, zigzags, or simple scroll-patterns are applied.

For a still more elaborate adornment, different-colored leathers are combined by 'inlaying.' Very rarely this is done by a mosaic process of the full thickness of the leather; most commonly the background is lowered or cut away very slightly, and the piece to be inlaid is a mere film. The lines of junction are generally concealed by broader lines of gold, impressed by means of a tool.

As to casing, the two stiff sides and the more flexible back are put together exactly as a paper box is made. The sheets of the book having been stitched together, as if to make a pamphlet, are then glued or pasted into the case by means of a piece of canvas glued fast to the back of the folded book and having loose strips projecting to be pasted to the covers; or in some very similar way.

Casing is made decorative chiefly in two ways —first, by the use of a textile material which is in itself decorative, and secondly, by printing upon the surface of the boards, whether covered with silk or cotton cloth or with paper, a pattern which may be 'blind,' that is to say, merely impressed without color, or in one or several colors. The first method, that by the use of stuff which of itself is ornamental, may be very rich if a brocade is used; and it is noticeable that the large and carefully made books of the Japanese, made to contain water-colors, pieces of old drawings, or rare old stuffs and the like, have sometimes for their sole decoration a beautiful piece of brocade for covering material, and sometimes this with the addition of richly worked metal corners. So, a private person, wishing to bind a lot of novels cheaply, may select printed calico or other inexpensive material and have all the volumes of one author bound uniformly; such work costing in Paris not more than one franc twenty centimes per volume, and in the American cities not over sixty cents a volume, even when the title is in gold letters on an attached leather label. Such work, if properly done, is, in a way, satisfactory. Thirty years of rather constant use, as of a popular book in a reading family, does not seem to injure it except by slightly loosening or 'spreading' the back. This, however, is for small books only; those weighing two pounds, or a kilogramme, can hardly remain firm more than two or three years. The 'decorative bindings' of modern English and especially American popular books are sometimes adorned in a very effective way either by stamped gold patterns rather deeply impressed upon the cloth sides, or by surface printing without deep incision, which printing may be in one or many colors. It is not hard to combine the two processes. Thus, in one rather pretty book, each cover, about 5½ × 8½ inches, has a conventionalized landscape in two dull colors; and above this picture, which occupies two-thirds of the surface, the title, consisting of seven words, is impressed in gold. Some admirable designs are prepared for English publishing houses in which the almost lost art of designing patterns of conventional leafage and the like has been revived. American work runs more often, as in the case mentioned above, toward descriptive and suggestive art, landscapes, emblematic compositions, even figure subjects of some pretension.

Books that are cased in this way need not necessarily be injured for future permanent binding; but it often happens that they are injured, as by the pasting of the edges of inserted plates to the folded sheets of the letterpress, or by sewing the sheets together in such a way that while the same sewing will not be found sufficient for the permanent binding, it has still injured the backs for better work. Of course, where any such device as the 'stabbing' of the sheets with tinned wire is used, the book is ruined as a permanent possession. It is much to be regretted that our valuable illustrated magazines are sold in that condition.

BOOK CLUB. A convenient title for private associations which print books for distribution among a limited circle of subscribers. Such clubs, being usually composed of scholarly men, and endowed with sufficient means, have rendered no slight services to literature and learning by rendering accessible a number of valuable works which had existed only in manuscript or in very rare printed copies. While associations like the Dilettanti Society (q.v.) accomplished some work in publishing, yet books as such were not their primary care. The Roxburghe Club (q.v.), founded in 1812, was the earliest English book club, properly so called; its system imposed on each member the reprinting of one book, and its work was not specially important. The Bannatyne Club, originated by Scott in 1823, was more practical. The Camden Society (1838) began the modern method of publishing by the society instead of leaving it to individual members; it has produced a long series of most useful historical publications. Among many English societies of the kind, the following are specially worthy of note: The Parker Society (1840-55), the Percy Society (1840-52), the Hakluyt Society (1846—), and the Early English Text Society (1864—).

During the Colonial Period in America, and that which immediately followed the Revolution, there were a number of literary associations whose members jointly published their writings, after the fashion of the time, in periodical form. The earliest and most famous of these was the Junto, founded by Benjamin Franklin in 1726. To its efforts the Philadelphia Library (1731), the University of Pennsylvania (1749), and the American Philosophical Society (1768) owe their small beginnings; and it published at different times ten periodicals of a literary and historical nature, most of which lasted for only a few numbers. The Drone Club, founded in 1792 by Charles Brockden Brown and others, and the Literary Confederacy, formed in 1817 by William Cullen Bryant, Robert C. Sands, James M. Eastburn, and Gulian C. Verplanck, were of the same nature. The first book club in the full sense, however, was the Seventy-six Society, originated in Philadelphia in 1854 by Edward D. Ingraham, stating its object as "the publication and republication of books and papers relating to the American Revolution." It lasted only three years, and was immediately succeeded in New York by 'The Club,' as it was called—it never received any specific name—and two years later by the Bradford Club, an offshoot from the former. In 1858 began the longer career of the Prince Society in Boston, which is still in existence, and has a list of twenty-six publications,

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made or in preparation. In the sixties there was a veritable mania for club publication, and absurd ventures were numerous, charging extravagant prices for their subscription books. The revival of club publication dates from about 1876, since when it has been carried forward in a dignified and rational manner. The Historical Printing Club of Brooklyn deserves a foremost place in this period. Founded in 1876, it has published, chiefly under the editorship of Paul Leicester Ford, over seventy valuable historical documents. But the best-known and most important of all is the Grolier Club, founded in New York in 1884 by a number of well-known makers and collectors of books. It has been very successful, not only in its distinctive purpose, but also in drawing together men of scholarly culture in the delightful home which it built for itself in 1889. Its membership was originally limited to fifty, but has now been extended to nearly four hundred. It has published in elaborate and beautiful form thirty important literary and bibliographical works, besides catalogues of the valuable exhibitions given by it at frequent intervals. Consult: Hume and Evans, *Learned Societies and Printing Clubs of the United Kingdom* (London, 1853); Growoll, *American Book Clubs* (New York, 1897).

BOOKKEEPING. The application of the general principles of debit and credit, and of classification of accounts, to the details of business. The object of bookkeeping is to furnish a complete and systematic record which may enable the proprietor readily to ascertain any desired facts regarding the progress and condition of his business and his financial relations with others. Without the knowledge thus gained, business cannot safely be carried on, and success or failure is often very closely related to the character of the work done at the bookkeeper's desk. In order that it may meet all the demands which are likely to be made upon it, bookkeeping must be practiced in such a way as to be intelligible, not only to the one who performs the work, but also to others. For if a dispute arises and it becomes necessary to place the books in evidence, suspicion naturally attaches to methods that can be understood and explained only by the interested party. There are two systems of bookkeeping which satisfy the requirements named, and which are accepted and used by practically the entire commercial world. They are known respectively as single-entry bookkeeping and double-entry bookkeeping.

Business records of some form or other were doubtless employed in the earliest times in the history of trade and credit. Of the early forms of bookkeeping, however, practically nothing is known. From the works of Leonardo of Pisa (q.v.) it appears certain that the merchants of Italy, France, and Spain practiced systematic bookkeeping for some time prior to the Thirteenth Century. It is, however, to the Italian traders of the Fourteenth and Fifteenth centuries, the enterprising merchants of Genoa, Florence, and Venice, that we owe the system of bookkeeping which takes the lead at the present time. In the year 1495 Luca Pacioli (q.v.), or Luca di Burgo, a Tuscan friar, published a work which contained a treatise upon double-entry bookkeeping. This is the first systematic treatment of the subject of which we have any record. From Italy the system spread to the Netherlands, thence to England, and from there to all parts of the world. And it is worthy of remark that the more complete system of double entry was perfected and brought into general use considerably before the system of single entry.

Double Entry. In double-entry bookkeeping, sometimes called the Italian method on account of its origin, every transaction requires equal entries on both sides of the ledger. The number of entries on the two sides need not correspond, but the amounts must. This representation of every transaction on both sides of the ledger arises from keeping account, not with persons alone, but also with property and allowances. It is this feature which gives the system its name and constitutes its essential characteristic. Property is conceived of as debtor or creditor, according as it has required outlay or has brought in value or discharged indebtedness.

The simplest combination of books suited to double-entry bookkeeping consists of a daybook, journal, and ledger, ruled in accordance with the forms given below. Daybook and journal may be combined to form the daybook-journal. The *daybook* is the one in which are entered the details of each transaction at the time it occurs. This is the original entry, and should be made with the greatest care. It is this which must be brought into court in case of legal dispute. In this book, therefore, as in all original entry, erasures should be avoided, and all changes, for whatever reason made, should be so managed that their nature can readily be determined. In the *journal* are entered the names or titles of the ledger which are to be debited and credited, together with the proper dates and amounts. These are determined from the daybook record, and the process is termed journalizing. This is a very important part of the bookkeeper's work, and makes the largest demands upon his ability to think correctly. The remainder of his work, with the exception of making out the balance-sheet, is to a large extent mechanical. The *ledger* is the book of accounts. From the journal the various items are carried to the ledger, items having the same name or title being gathered together under that title, each on its proper side, debits to debit side, credits to credit side; the left-hand side in this, as in all other books, being debit, and the right credit. The ledger, on account of the classified and summarized nature of its contents, is the business man's principal book of reference. If he wishes to find out how much John Doe owes him, it is to his ledger that he goes for information. Should he wish to pay Richard Roe the balance due him, it is from the ledger he will determine the amount which he must remit. In short, when he desires full, up-to-date information regarding any matter connected with his business, it is generally the ledger which is called into requisition. Toward the perfection of the contents of this book, therefore, all the bookkeeper's work is aimed. The process of carrying the items of the journal to the ledger is termed 'posting.' In performing this work, the careful bookkeeper will follow an invariable order, that the process may be made as nearly mechanical as possible. First, the year should appear in the column at the left on the side to which the item is to be posted; the year need not be entered again until it changes. Next come month, day, explanation, the page of the journal from which the entry is brought,

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and the amount of the entry. The page of the ledger to which the item has been posted is then immediately entered in the column at the left of the journal, on a line with the item transferred. The last step is taken to leave evidence that the posting has been done.

To open a set of books by double entry, the bookkeeper states in the opening entry of the daybook the kind or name of the business in which the proprietor is to engage. He then enumerates in detail the items which are to constitute his investment, such as cash, real estate, accounts due him, etc., and the debts, if any, which are to be paid out of the business. These two sets of items represent, respectively, his resources and liabilities. The difference between them will be his net investment. When this entry is journalized, each of the items which will make up the resources will be debited, and each of the titles entering into the liabilities will be correspondingly credited, and the proprietor's name or stock will be credited for the net investment, or the difference between the sums of the two. When this journal entry has been posted, the books are properly opened. When the posting for any period has been completed, the debit and credit sides of the ledger should be equal. To determine whether this is the case or not, the *trial balance* is taken—that is, all the headings of the ledger, excluding those which are in balance or ruled up, are entered on a suitable sheet, together with the debit and credit footings of each in their proper columns; the two columns are then footed and ought to give equal amounts. If the results are not equal, there is certainly some error which must be found. On the other hand, should the trial balance prove, it would not be certain that no mistakes had been made. For the trial balance will not discover errors of computation, omission of transactions, posting to wrong accounts, etc. The trial balance should be taken, as a rule, at least once a month. The *balance sheet*, which is to be distinguished from the trial balance, involves a classification and analysis of accounts in such a way as to exhibit in detail the resources, liabilities, losses, gains, net gain or loss, and present capital of the business. The balance sheet is of great importance to the business man, and should be made at least once a year, or whenever the business is closed out or otherwise disposed of. It involves the taking of an inventory of all the property on hand, which, in some lines of business, is quite a laborious process. A form of balance sheet is presented below.

When accounts balance, when they become crowded for space, or when they show a loss or gain at the time of making a balance sheet, they are ruled up or closed. The form of closing varies somewhat in accordance with individual taste. The foregoing example of ledger accounts furnishes also an illustration of a simple and convenient form of closing. When red ink is used in the process, it indicates that the entries distinguished by it have been made upon the wrong side of the ledger for the purpose of balancing, and before the work can be regarded as complete, they must be transferred to the opposite side of the ledger, either below the rulings of the account just closed, or below some other heading of the ledger, which is indicated in the red-ink entry.

Aside from the purpose of eliminating from an account the element of loss or gain, or of preventing crowding, an account is closed in order to condense it into a single item, thus simplifying and making intelligible at a glance all the information which the account can give. After a general closing of the ledger it is usually advisable to take off a trial balance of the ledger balances to make sure that all have been correctly transferred; as a mistake in this matter may cause great trouble at the time of the next trial balance.

In the simple combination of books for double-entry bookkeeping, which has been explained, practically all the principles of the system are exemplified. In addition to the books named, however, there are generally found in use one or more such books as the following: Cash-book, sales-book, invoice-book, bill-book, order-book, check-book, inventory-book, etc. It is unnecessary to enter upon an explanation of the purpose of these books, it being sufficiently indicated by the name. Of the ways in which they may be combined, there is great variety, every business and every establishment introducing some peculiarities of its own. The general principles, however, are the same in all. They may be used either as principal or auxiliary books. A principal book may be defined as one from which or to which posting is done; an auxiliary book, one kept for convenience of reference, but from which no posting is done. When these books are used purely as auxiliary books, they do not affect the work in the other books. When, however, they are used as principal books, all entries found in them are omitted from the journal. No account is kept in the ledger of the property with which such books respectively deal; or if kept, only the footings are posted at regular intervals. The latter plan is followed by some in order that a trial balance of the business accounts may be taken without reference to any other book than the ledger. When this is not done, the footings or balances from such books must be properly entered in the trial balance before it can be expected to prove. The ledger titles found on the debit side of these books must be credited in the ledger with the amounts set opposite them and those on the credit side similarly debited. These books are often ruled with special columns for items of frequent occurrence, and when this is done the footings of such columns only are posted to the title which heads the column in accordance with the principle stated below. A form of the cash-book is given below and the method of posting and ruling the same is illustrated.

SINGLE ENTRY. Single-entry bookkeeping, in its pure form, which, however, is rarely used, keeps no account of property. Only personal accounts appear in the ledger, which as a consequence will not be in balance except when the business is closed out. It therefore involves less labor than double entry, and, on the other hand, furnishes fewer checks for detecting errors. It is, however, well adapted to some forms of business, and its results are as intelligible and significant as in the more complete system. It fails, of course, to give detailed information in regard to the sources of gain or loss, and this, for some kinds of business, is a fatal objection, for it is this information, clearly set forth by the double-

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entry balance-sheet, which the merchant needs to keep him within the lines of safety and profit.

In single-entry bookkeeping, in its pure form, the only book needed, besides the ledger, is a day-book or journal, in which are made all entries involving debit or credit of persons. The cash-book, sales-book, etc., are combined with the books first named as in double entry, but when so used the method becomes no longer pure single entry, but a mixed form. To determine the proprietor's capital at any time, when the books are kept by single entry, an inventory of resources and liabilities is taken, the difference between the totals representing the capital. The loss or gain is found by comparing the present with the former capital. So great is the importance to a concern of its books, and so great the calamity of their loss by theft or fire, that they are usually guarded with great care and kept in a fireproof safe when not in use.

DETAILS. The principles of bookkeeping remain to-day practically as set forth by Luca Pacioli. In details, appliances, and forms, however, there have been many changes. Most of the important changes in the forms of books are of recent date and consist largely in the introduction or extension of the use of special columns. One or two ledger forms which are now in use may be mentioned in this connection. The *centre-ruled ledger*, as it is termed, has the credit amount column arranged alongside of the debit in the centre of the page. It is followed by the *folio column*, the *explanation* and *date columns*, in the order named. The advantages claimed for it are that, being brought close together, comparison of the two columns is made easier, the trial balance can be more readily taken, and in ruling the account no trouble arises because of the rolling of the page. The *card system*, which has become indispensable in so many lines of work, is also being introduced. Large numbers of firms are now using either the detachable or loose-leafed ledger, or have adopted the card ledger. The advantages claimed for these forms over the ordinary ledger are the saving in indexing, the removal of dead accounts, escape from the continual transfer of accounts which have become crowded, the elasticity which permits new accounts to be introduced indefinitely, ease of classification, etc.

In no part of the actual practice of bookkeeping has there been a greater advance than in that which deals with the orders sent to the home office by the traveling salesman. Instead of sending these orders, as formerly, illegibly written on any scrap of paper that came to hand, and leaving it for the home office to make the proper entries in the regular sales-book, the sales-agent is now furnished with a book with perforated leaves properly ruled and corresponding with a book kept in the office. In this book the agent enters his orders, giving prices, terms, etc., and making extensions and footings complete. The leaves containing the orders are then torn out along the perforated line, sent to the home office, and there by a simple contrivance bound into the book devoted to this particular agent. From this book of original entry, posting is made directly to the ledger. The agent is thus made a part of the working force of the home office, and by the saving thus accomplished the office expenses have been decreased without loss of accuracy or efficiency, and with an actual increase in business.

EXPERT WORK. An expert bookkeeper is sometimes called upon to clear up difficulties brought about by slovenly methods of work, or by dishonest practices. It need hardly be remarked that the expert reaches his conclusions not through any mysterious or extraordinary insight, but by systematically taking the original entries and determining whether they have been correctly handled or not. If fraud is present, it may be necessary to correspond with the various firms represented in order to discover to what extent fictitious and fraudulent entries have been made. This takes time, but is entirely simple and makes it impossible to escape from the conclusions to which the method leads. If proper entries were not made, or have been lost, the discovery of this will be in some measure accidental, determined through correspondence and settlement with the firms with which the concern in question has had dealings. As in every other department of the bookkeeper's work, so in this, system, care, and attention to details finally secure the result sought.

BOOKKEEPING FORMS.

DAYBOOK

JANUARY 2, 1902		
Bela M. Wilson began to-day the grain, flour, and feed business with the following investment:		
RESOURCES		
Cash per cash-book	5,000.00	
William Jones, note due Jan. 5	300.00	
Joseph Call, on account	400.00	
George Randolph, on account	300.00	6,000.00
LIABILITIES		
Note favor Thomas Wall	200.00	
Charles Johnson, due him on account	550.00	
Nathan Barlow, due him on account	250.00	1,000.00
Bought of Hanley Bros., on account:		
100 bushels beans @ $1.50	150.00	
200 " wheat @ .70	140.00	
500 " corn @ .35	175.00	
100 barrels flour @ 4.00	400.00	865.00
Sold F. E. Thomas, on account:		
2 bushels beans @ $2.00	4.00	
25 " wheat @ .90	22.50	
1 barrel flour @ 5.00	5.00	31.50
3		
Gave Hanley Bros. my note at 30 days for $265.00 on account		265.00

JOURNAL

JANUARY, 1902

		2		
	Cash		5,000.00	
1	Bills Receivable		300.00	
2	Joseph Call		400.00	
2	George Randolph		300.00	
3		To Bills Payable		200.00
4		Charles Johnson		550.00
4		Nathan Barlow		250.00
1		Bela M. Wilson		5,000.00
		2		
5	Mdse		865.00	
5		To Hanley Bros		865.00
		2		
6	F. E. Thomas		31.50	
5		To Mdse		31.50
		2		
5	Hanley Bros		265.00	
3		To Bills Payable		265.00

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LEDGER—Page 5 MERCHANDISE

1902						1902					
Jan.	2		J.	1	865.00	Jan.	2		J.	1	31.50
"	3		J.	1	650.00	"	2		J.	1	39.00
"	4		J.	1	800.00	"	2		C.	2	225.00
* "	6	Loss and Gain		7	110.50	"	3		C.	2	170.00
						"	4		C.	2	60.00
						* "	6	Inventory			1,900.00
					2,425.50						2,425.50
Jan.	6	Inventory			1,900.00						

The Loss and Gain should be carried to the credit of the Loss and Gain account, on page 7 of the ledger.

* Use red ink for these entries and for the rulings.

TRIAL BALANCE AND BALANCE SHEET, JANUARY 6, 1902

L.F.	NAME	DR.	CR.	LOSSES	GAINS	RESOURCES	LIABILITIES
1	Bela M. Wilson	15.00	5,000.00				
1	Bills Receivable						
2	Joseph Call	400.00	200.00			200.00	
2	George Randolph	300.00				300.00	
3	Bills Payable		865.00				865.00
4	Charles Johnson	450.00	550.00				100.00
4	N. Barlow		250.00				250.00
5	Merchandise	2,315.00	525.50		110.50	1,900.00*	
5	Hanley Brothers	630.00	865.00				235.00
6	F. E. Thomas	31.50	25.00			6.50	
6	John Hamlin	300.00	1,050.00				750.00
7	Expense	576.00		51.00		525.00	
8	Real Estate	3,500.00				3,500.00*	
C. B.	Cash Balance	813.00				813.00	
		9,330.50	9,330.50	51.00	110.50	7,244.50	2,200.00
	Wilson's net gain			59.50			
				110.50	110.50		
	Wilson's net investment		4,985.00				
	" net gain		59.50				
	" present capital						5,044.50
						7,244.50	7,244.50

* Entries marked * in Resources column represent inventories, and may be made in red ink to distinguish them.

Page 2 FORM OF CASH-BOOK (DOUBLE ENTRY)

Cash Receipts

1902						
Jan.	2	V	B. M. Wilson	Investment	5,000.00	
"	2	5	Mdse.	Sold John King	225.00	
"	3	2	Jos. Call	On acct.	200.00	
"	3	5	Mdse.	Sold W. C. Robarts	170.00	
"	4	5	"	" E. F. Johns	60.00	
"	4	6	F. E. Thomas	On acct.	25.00	
"	4	5	T. M. Cranston	In full of acct.	39.00	
"	5	1	Bills receivable	William Jones's note	300.00	6,019.00
						6,019.00
Jan.	6	...	Balance		.....	813.00

Page 3—opposite page 2.

Cash Payments

1902						
Jan.	2	7	Expense	Office Furniture	200.00	
"	2	7	"	Safe, H. K. & C.	250.00	
"	2	7	"	Office books and stationery	20.50	
"	3	4	Chas. Johnson	Paid him on account	250.00	
"	3	5	Hanley Bros.	On account	365.00	
"	4	1	Bela M. Wilson	Drew for private use	15.00	
"	4	6	John Hamlin	On account	300.00	
"	4	7	Expense	Freight bills	93.50	
"	5	7	"	Painting sign	12.00	
"	5	4	Chas. Johnson	On account	200.00	
"	5	8	Real Estate	Bought store and lot	3,500.00	5,206.00
"	5		Balance			813.00
						6,019.00

All rulings and balancing entries should be made with red ink.

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BOOK-LICE. Small, pale, wingless insects of the family Psocidæ. To the casual observer they closely resemble plant-lice. Some of them are very destructive of books and insect collections, while other forms live in the open on lichens, maple and willow trunks, etc. One of the commonest of the book-eaters is *Atropos divinitoria*. The minute pseudoscorpions (Chelifer) sometimes found in old books are called 'book-scorpions.' See BOOKWORM.

BOOK OF COMMON ORDER, THE. The name of the Church of Scotland service, evidently suggested by the familiar Anglican title. Its source was that used by the Genevan English Church, and, tentatively used in 1562, it became general throughout Scotland in 1564.

BOOK OF COMMON PRAYER. See PRAYER-BOOK.

BOOK OF MARTYRS, THE. One of the most famous books in religious history. Written in Latin, by John Foxe, in 1559, it appeared in his own English translation, under the title of *Actes and Monuments*, in 1563, though from the first popularly called the *Book of Martyrs*. It relates the history of persecution down to about the end of Mary's reign.

BOOK OF MORMON. A book issued in 1830 by Joseph Smith, who professed to have been led to its discovery by an angel. The gold plates inscribed with Egyptian characters, and accompanied by magic spectacles to assist in their interpretation, disappeared, but Smith published a professed translation, which became the sacred book of the Latter Day Saints. The work was, in reality, simply an adaptation of the manuscript work of 1809 by a Presbyterian clergyman, Spalding, who in it attempted to identify the American Indians with the Lost Tribes. In style the book is an imitation of the Bible, from which it has borrowed many passages. It is divided into sixteen sections, supposed to have been written at various times, and giving a history of America from the days of the confusion of tongues at Babel until the time of Moroni, the the last survivor of his race who, in 420 A.D., buried the plates in the hill where Smith found them. While a small colony had settled in America, according to the Book of Mormon, after the dispersion at Babel, the important immigration took place in the reign of Zedekiah, about B.C. 600. In obedience to a divine command a company of sixteen people, led by Lehi, reached America. Preserving their ancient religion in its purity, they received Christianity from Christ himself, who spent the forty days after his resurrection among them. In 384 this Christian nation was destroyed after a long series of wars.

BOOK OF SAINT ALBANS. The title of a rhymed book on certain sports, wholly or partly written or translated by Dame Juliana Berners, and first printed in 1486. It consisted of four parts: "Hawking," "Hunting," "Lynoge of Coate Armiris," and "Blasying of Armys." Consult Blades, *Introduction to the Boke of Saint Albans* (London, 1881).

BOOK OF SENTENCES. A theological treatise belonging to the Twelfth Century, discussing various questions relating to God, Christ, the universe, and the virtuous conduct of life. Its author was Peter Lombard, Bishop of Paris, later known as Magister Sententiarum, on account of this work.

BOOK OF SNOBS. Under this title appeared in 1848 *The Snob Papers*, by Thackeray, a collection of papers contributed to *Punch* (1843).

BOOK OF SPORTS. See SPORTS, BOOK OF.

BOOK OF THE DEAD. See DEAD, BOOK OF THE.

BOOK OF THE DUCHESS. The title of a poem by Chaucer, written to console John of Gaunt for the loss of his Duchess in 1369. It is conventional, artificial, imitative, and is drawn from Machault's *Dit du lion* and *Dit de la fontaine amoureuse*.

BOOK-PLATE. A typographical or pictorial label, used to denote the ownership of a book. Book-plates are considered to have had their origin in Germany; though an unsupported claim has been made that they were used in Japan in the Tenth Century, and certain small clay tablets are believed to have performed in Babylonia and Assyria an office similar to that of the book-plate of to-day. The earliest printed book-plate we know to-day was used about 1480. It is a hand-colored heraldic design, and recorded a gift of books and manuscripts to the Carthusian monastery of Buxheim in Swabia. Until Albrecht Dürer gave his attention to the designing and engraving of book-plates, they were rude wood-cuts utterly lacking artistic form. Dürer is sometimes called 'the father of book-plates,' because under his hand they became works of art. Several undoubted book-plates of his workmanship are known. The earliest of these bearing a date (1516) was the property of Hieronymus Ebner of Nuremberg. Dürer made a book-plate for Bilibald Pirckheimer of the same city which is believed to be earlier than 1503. Among the famous early German artists who engraved book-plates on wood or copper were Lucas Cranach, Hans Holbein, Jost Amman, and Virgil Solis. In the Eighteenth Century Daniel Chodowiecki engraved several very charming designs. Ever since Dürer put his impress upon them, the ornamentation of book-plates has been an important feature, and while their first purpose is to indicate the ownership of the book in which they are pasted or bound, they may, by perfection of design and execution, give pleasure as works of art. Allegory, quotations from the classics, the name of the owner, and his coat of arms are the prominent and customary features.

From Germany the use of the book-plate spread to France, and finally to all Continental countries. There is considerable similarity between the early book-plates of Germany and France, but the former are more numerous. The French engravers, as time went on, tended to over-ornament their designs, and the later examples suffer a great loss of dignity for which the delicacy and exquisiteness of their workmanship is no compensation. There are a few very charming bits by such artists as Collin, Durand, and Eisen.

England was apparently a little slow in adopting the book-plate, as her first ones seem to have been made toward the end of the Sixteenth Century; but once fairly started, the idea spread rapidly, with the result of making English book-plates outnumber those of all other countries. Up to the beginning of the Eighteenth Century most English book-plates are in the style known, by the universally accepted nomenclature of Warren, as early armorial. This shows the coat of

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arms and the name and motto of the owner, with surrounding foliations originally intended to represent the slashed mantle of the helmet. The Jacobean style, extending approximately from 1700 to 1750, is very formal and heavy; its ornamentation resembles carved wood, and the right and left sides of the design usually coincide with precision. About 1750 came in the Chippendale style, so called from the well-known designer and upholsterer of furniture. Light, graceful effects took the place of the sombre designs; fruit and flowers, even pictures of meadows and streams with shepherdesses and swains were introduced. This was succeeded by the ribbon and wreath style, whose simple, chaste manner well expressed contemporaneous changes of manners and forms. At a date difficult to give, but toward the middle of the Eighteenth Century, bookmen and engravers began to show more individuality in their book-plate designs; the portrait and the pictorial plate came in; library interiors and many allusions to classical allegory and to the feats of arms or peaceful pleasures of the owners are frequently found; while landscapes and rivers, castles and ruined abbeys contribute to the variety of the pictured scenes. Such names as Hogarth, Marshall, Vertue, Bartolozzi, and Bewick are signed on English book-plates.

The book-plates first used in America were of English make, brought over by the wealthy colonists. They possess great interest as memorials of the old families; but the plates engraved by the hands of our first American engravers, Nathaniel Hurd and Paul Revere, of Boston, Amos Doolittle, of Connecticut, and Alexander Anderson, of New York (the last of more recent date but the first to engrave on wood), easily surpass them in value. The earliest date on an American book-plate by an American engraver is 1749, on the Thomas Dering plate engraved by Hurd. There were numerous early engravers through the New England Colonies and States, and in and around New York, Philadelphia, and Baltimore, whose work is highly prized by the collector and student. All of these followed in the main the English styles, though some crude designs, incorrect heraldry, and clumsy engraving mark certain efforts as the work of untrained hands who had no good models to work from. The book-plate of George Washington, though engraved in England, is the most highly valued American book-plate of the early period. The few plates known to be the work of Paul Revere rank next, and high prices have been paid for them.

The present revival of interest in the book-plate dates from the foundation of the Ex Libris Society in 1890. Though the headquarters are in London, the membership is thoroughly cosmopolitan. An illustrated monthly journal is issued to members. France and Germany also have societies which issue publications at stated intervals. All these club journals are of the utmost value and importance to those who wish to keep in touch with the progress of book-plate affairs. There is no organization of book-plate collectors in the United States. Book-plates have become of sufficient importance to be listed by the sellers of old books and to have an occasional catalogue devoted to them entirely. Auction sales of book-plates are not uncommon, and their recognition as interesting items of literary property is widespread. The late Sir Augustus Wollaston Franks, of London, had a collection which is said to have numbered toward 200,000. It is now in the British Museum. The late Dr. Joseph Jackson Howard (who acquired the first collection of book-plates known to have been made) possessed more than 100,000 specimens. The Count Karl Emich zu Leiningen-Westerburg has a very large and valuable collection. Several important collections exist in the United States, notably those of John P. Woodbury, Henry S. Rowe, and Fred. J. Libbie, of Boston, W. E. Baillie, of Bridgeport, Conn., and the Grolier Club, of New York, which gave, in 1894, the first public exhibition of book-plates in America. At the present day the black-and-white reproductions of drawings form the greater number of book-plates, but the copper-plate engraver has found in the renewed interest in these marks of book-possession an increasing demand for his art. Edwin Davis French, of Saranac Lake, N. Y., Sidney L. Smith, of Boston, W. F. Hopson, of New Haven, Conn., Charles W. Sherborn and George W. Eve, of London, have international reputations as engravers on copper.

Book-plate literature has increased rapidly in the last decade. Very numerous contributions to periodicals and many monographs of permanent interest, but which deal with subdivisions of the subject, have been published. These would swell a complete bibliography to the dimensions of a book. The following list comprises the authoritative works relied upon by the serious student of book-plates: Poulet-Malassis, *Les Ex Libris français* (Paris, 1875); Warren, *A Guide to the Study of Book-Plates* (London, 1880); Carlander, *Svenska Bibliotek och Ex Libris anteckningar* (Stockholm, 1889); Warnecke, *Die deutschen Bücherzeichen* (Berlin, 1890); Guigard, *Nouvel armorial du bibliophile* (Paris, 1890); Bouchot, *Les Ex Libris et les marques de possession du livre* (Paris, 1891); Castle, *English Book-Plates* (London, 1892); Hamilton, *French Book-Plates* (London, 1892); Hardy, *Book-Plates* (London, 1893); Allen, *American Book-Plates* (New York and London, 1894); Labouchere, *Ladies' Book-Plates* (London and New York, 1895); Hamilton, *Dated Book-Plates* (London, 1896); Fincham, *The Artists and Engravers of British and American Book-Plates* (London, 1897; Count Karl Emich zu Leiningen-Westerburg, *Deutsche und österreichische Bibliothek-Zeichen, Ex Libris* (Stuttgart, 1901); Stone, *Women Designers of Book-Plates* (New York, 1902).

BOOK'SELL'ING. The earliest history of the production and sale of books is so obscure that little can be added to what is told in the article BOOK of the Chaldean tablets of baked clay, the Egyptian *Book of the Dead*, and other similar productions. We find, however, in Athens, something approaching to an organized trade in books about the middle of the Sixth Century B.C., when Pisistratus paid scholars from the municipal treasury for preparing an authorized text of Homer and Hesiod for the use of copyists. Through the Museum of Alexandria and the publishers of Rome, whose work was largely carried on by Greek scribes from Alexandria and Athens, this text has brought down to us the poems of Homer and Hesiod. It is probable that the first regular sales of literature in Athens, and, therefore, the first in Greece, were carried on by students of philosophy. Diogenes

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BOOKPLATE OF THE GROLIER CLUB

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UNI. OF MICH.

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Laërtius says that the hearers of Plato interested themselves in the work of circulating the written reports of his lectures, sometimes selling them, but more frequently in the first place lending them out for hire. The facilities for the work of scribes in Athens were evidently, however, during the most important period of Athenian literature, inadequate to supply the demand of the scholars. Books continued to be very costly and their ownership was limited to the wealthy. Diogenes Laërtius is the authority for the statement that Plato paid for three books of Philolaüs which Dionysius had secured for him in Sicily three Attic talents, equal in currency to $3240, when money was worth much more than it is now. Aristotle says that Gellias paid a similar sum for some few books of Speusippus. Böckh is of opinion that some kind of a book trade was carried on in the orchestra of the Athenian theatre, during the time, of course, when no performance was going on.

By the time of Xenophon (about B.C. 400) Athens was the centre not only of the literary activities of Greece, but of any book trade that existed. The first booksellers prepared with their own labor the scrolls, mainly papyrus, that constituted their stock in trade. The next step in the development of the business was the introduction of the capitalist, who, instead of working with his own hands, employed a staff of copyists and sold the products of their labor. A comedy by Aristomenes refers to a dealer in books. Eupolis speaks, in B.C. 430, of the 'place where books are sold,' the inference being that a special place in the market was reserved for the book trade. Nicophon, in the next century, gives a list of men who support themselves with the labor of their hands, and groups the bookseller with the dealers in food and household utensils. It would appear that the Athenian booksellers derived receipts not only from the sale or from the hire of manuscripts, but from the reading of these aloud in their shops to hearers who paid for the privilege. After the conquest of Greece by the Romans there was a revival in Athens of the trade in books owing to the increased demand from the scholars of Rome, where Greek was accepted as the language of refined literature and its authors were diligently studied.

About B.C. 250 the literary activity encouraged by Ptolemy Philadelphus caused Alexandria to become one of the great book marts of the world. Its first publishing and bookselling were done in connection with the great museum founded by Ptolemy. This comprised in one organization a lending and reference library, a series of art collections, a group of colleges endowed for research, a university for instruction, an academy with functions like those of the French Academy, and a series of work-rooms where the scribes prepared from authenticated texts the papyrus manuscripts to be distributed throughout the civilized world. Ptolemy Soter gave authority to traveling scholars to collect for the museum in Alexandria all the authenticated manuscripts they could find. He is said to have supplied food to the Athenians during a famine only on condition that they would sell to his representatives authenticated copies of the tragedies of Æschylus, Sophocles, and Euripides. For these, in addition to the promised shipment of corn, the sum of fifteen talents was paid. Through their enterprise in training numbers of skilled scribes (including now not only educated slaves, but many of the impecunious scholars of the university), and by means of the distributing facilities afforded by the commercial connections of their capital, the Alexandrian publishers retained in their hands for more than two centuries the control of the greater part of the book production of the world. The publishers of Athens disappeared, while those who, in the last century B.C. and the first century A.D., were carrying on book businesses in Rome were obliged to have done in Alexandria the work of transcribing such of their issues as were in the Greek language, these forming, until the time of Trajan, a very large portion of their total production. The earlier Roman publisher found it usually to his advantage to send to Alexandria his original texts and to contract with some Alexandrian correspondent who controlled a book-manufacturing establishment for the production of the editions required.

It is in Rome that we find the first records of publishers whose names have been preserved. During the Second Century B.C. a number of important and costly literary enterprises were undertaken; and the continued production of books addressed to a general public implies the existence of machinery for their distribution. Here, as in Athens, those who first interested themselves in publishing undertakings were men who combined with literary tastes the control of sufficient means to pay for the production of the editions. Their aim was not at the securing of profits, but the service of literature and of the State, and these earlier publishing enterprises must frequently have resulted in a deficiency. As the size of the editions could easily be limited to the probable demand, and as further copies could always be secured when called for, one would imagine that the expense need not have been considerable. The high prices, however, which under the competition of a literary fashion it became necessary to pay for the educated slaves trained as scribes, constituted a serious item of outlay. Horace speaks of slaves competent to write Greek as costing 8000 sesterces, about $400. Calvisius, a rich *dilettante*, paid for each of his *servi literati* as much as 10,000 sesterces. In one of the laws of Justinian in which the relative price of slaves is fixed for the division of estates, *notarii* or scribes are rated fifty per cent. higher than artisans.

The man whose name is most intimately connected with the work of publishing in the time of Cicero was his friend Titus Pomponius Atticus, who organized, about B.C. 65, a great book-manufacturing establishment in Rome with connections in Athens and Alexandria. The editions issued by him came to be known as the *Ἀττικιανά*, *Attikiana*, and secured wide repute for their accuracy. Atticus did not confine his book business to his publishing house, but established retail dealers, *tabernarii*, in different quarters of Rome, and also in one or two of the provincial capitals. The publishers of Horace were the brothers Sosii. Their shop was in the Vicus Tuscus, near the entrance to the Temple of Janus. It was in a book-shop that Clodius hid himself (B.C. 58) from his pursuers. Later we find the stalls of the bibliopoles placed in the most frequented quarters of the city, by the Janus gate of the Forum, by the Temple of Peace, on the Argiletum, in the Vicus Sandalarius, and on the

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Sigillaria. Martial speaks of the street Argiletum as being chiefly occupied by the booksellers, with whom were associated the fashionable tailors. Both Horace and Martial describe the bookshops as places of resort where the more active-minded citizens were in the habit of meeting to look over the literary novelties and to discuss the latest gossip, literary and social.

By the close of the First Century the book trade in Rome and in other larger cities of the Empire had developed into large proportions. The packets from Alexandria brought into Rome great cargoes of papyrus from Egypt, which speedily found their way into the work-rooms of the publishers. Here a hundred skilled slaves followed with swift pens the rapid dictation of the readers, who from time to time relieved each other; others occupied themselves with the work of comparison and revision, while a third group covered the completed manuscripts with proper bindings. In the book-shop, *taberna*, collections of the accepted classics and of the latest literary novelties are attractively presented. Here a cheap edition of the *Æneid* for school use is sold for a few pennies; there, great sums are expended for a veritable 'original' text of some work by Demosthenes, Thucydides, Cato, or Lucilius, while a third buyer is placing a wholesale order for a 'proper assortment' of literature to serve as an adornment for a new villa. From the Roman shops large shipments of books were made to other cities, even as far as Gaul. The average editions of works addressed to the general public are estimated by Birt to have comprised from 300 to 1000 copies.

By the time of the accession of Constantine (A.D. 306) the Roman book trade had very much decreased, and with the removal (in 328) of the capital to Byzantium the activities of Rome in connection with general literature came very much to an end. Under the rule of Theodoric the Goth there was, mainly owing to the influence of his minister Cassiodorus, some continued interest in literature, which manifested itself in the preservation and extension of libraries and in the maintenance of the schools. There was, however, during the time of the Gothic rule in Italy, no such demand for books as to render practicable the continued existence of booksellers.

The next bookselling undertakings were carried on from the *scriptoria* of the monasteries. For some centuries, however, the books written in these *scriptoria* were produced for the use only of the monks or of the pupils under their charge. Later there came into vogue a practice of exchanging manuscripts between monasteries, a practice which developed in a measure into a trade in books. There would be in one *scriptorium* a manuscript of special antiquity and authority; from this the scribes would prepare copies which would carry with them a varying value, depending first upon the record (the pedigree, so to speak) of the original manuscript, and secondly upon the repute that had been secured by that particular *scriptorium* for accurate and scholarly work. See BENEDICTINE.

For centuries the knowledge of reading and writing was so far confined to the clerics that there was no demand for such manuscripts outside of the monasteries. Later, under the influence of such monarchs as Alfred in England, and through the developed interest of certain other princes who had owed their early education to monastery schools, the fashion arose of collecting in the libraries of kings and nobles manuscripts containing specimens of the world's literature. Such a taste could advantageously be cultivated by the abbots and their scribes. A nobleman desiring, as a matter of scholarly interest or honorable ambition, to possess a certain manuscript, was willing to pay a high price for it. Not a few of the landed estates connected with the literary monasteries, and more particularly with those of England and Burgundy, were largely secured in exchange for noteworthy manuscripts.

The next important work in the production, exchange, and sale of books was carried on in the universities. The term *stationarii*, which stands for the official bookmakers of the university, first appears in Bologna in 1259 and in Paris some years later, but the work of preparing books for the use of instructors and students had already been carried on for a number of years. In Paris, as in Bologna, the *stationarii* were university officials, and, in the majority of cases, graduates. The conditions of their trade, closely controlled by the regulations of the university, were peculiar. During the Thirteenth and part of the Fourteenth Century, the books supplied to the students were not sold, but rented, and the amount of the hire was fixed by university regulation. The *bidelli* of the university published from term to term a list of the authoritative university texts which the booksellers were ordered to prepare, to keep in stock, and to hire out. The statutes of the University of Padua of the year 1283 provided that two *stationarii* should be employed. The rental for a term of a fortnight of a *pecia* (a division of from 16 to 32 pages) of the prescribed text was four *denarii*, of the *glossarii* (the commentaries on the text) five *denarii*, and of texts not on the official list six *denarii*. In the year 1289 the list of texts which must be kept in stock in Bologna comprised 117 works. In Padua, as in Bologna, the *stationarii*, in entering upon their business, had to make a deposit of 400 *libræ*, and go through an examination. Toward the close of the Thirteenth Century the statutes of Bologna permitted the sale of manuscripts for a commission of 2½ per cent.

The authorities of the University of Paris exercised from the beginning a very complete control over all the details of making, renting, and selling books. Two centuries and a half before the introduction of the printing-press the book trade of the university had become in great measure the book trade of the city. The scribes and their masters who were manifolding manuscripts in the Latin Quarter were not only supplying text-books to the students of the university, but preparing literature for the scholarly readers of France and of Europe. The book-dealers of Paris constituted for centuries a guild organized within the university. Its members, the *libraires jurés*, were members of the university, and its operations were under the direct control of the academic authorities. It was essential not only to secure for the members of the university, at a fixed and moderate charge, a sufficient supply of correct and complete texts of the prescribed works, but also to protect these students from the contamination of heretical writings or of heretical comments on books of accepted orthodoxy. (See CENSORSHIP.) In the univer-

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sities of Oxford and Cambridge the *stationarii* began their work some years later than in Paris or Bologna. They had, however, the advantage of freedom from the greater portion of the restrictions which hampered the work of the French and Italian scribes, and their business developed so actively that they soon became the booksellers of the university towns and in large part of the scholarly public of the whole country. It was, of course, from the university term that the name 'stationers' came at the outset to be applied to the organized book-dealers of Great Britain. The first guild of the British book-dealers (the forerunner of the Stationers' Company of 1556) completed its organization in 1403, nearly sixty years before the introduction into England of the printing-press.

Outside of the universities, an important trade in manuscripts came into being with the close of the Fourteenth and beginning of the Fifteenth Century. The headquarters, not only for Italy, but for Europe, of the trade in Greek manuscripts was for a number of years in Venice, whose close relations with the East gave it an early advantage in connection with this particular class of Eastern products. Among the great manuscript dealers of Italy of the Fourteenth Century may be noted the name of Auretinus and Vespasiano of Florence, of Aurispa of Venice, and Galiotti of Milan. The trade in manuscript books in the Low Countries was distinguished by the beauty of the art work which was associated with the text of the scribes. The manuscripts from Bruges secured, chiefly on this ground, a larger price in the market than is noted for the productions of any other book centre of Europe. The Dukes of Burgundy, during the first half of the Fifteenth Century, were noted for their literary interests, and did much to further the book trade of Ghent, Antwerp, and Bruges. The first publishers' guild of the Low Countries was organized in 1424 at Ghent.

The invention of printing (c.1450) revolutionized the methods of bookselling, but the revolution extended over a period of nearly half a century. For years after the first printers began their work in Germany, in France, and in Italy, the production of manuscripts went on, and even as late as the beginning of the Fifteenth Century certain of the noble book collectors in Italy took the ground that the printed book was for the use of the vulgar reader only, and that the libraries of gentlemen must be devoted exclusively to the manuscript form of literature. Gutenberg's first partner, Fust, and his associate, Schöffer, were the first printers who acted also as publishers and booksellers. Notwithstanding the many difficulties with which they had to contend, they were able to offer their books at prices which to the old dealers in manuscripts seemed so astounding as to give some pretext for the charge of magic. Madden says that a copy of the 'forty-eight line Bible,' printed on parchment, could be bought in Paris in 1470 for 2000 francs, while the cost of the same text a few years earlier in the manuscript form would have been five times as great. One of the earlier of the important publishing centres of Europe was Basel. Its most famous name for our purpose is that of Froben, in later years the publisher and friend of Erasmus. The publisher whose work was, between 1475 and 1512, the most important in Germany was Koburger of Nuremberg, who by the year 1500 was utilizing no less than twenty-four presses, and sending out annually more books than any other publisher of his time. He had branches or agencies in Frankfort, Paris, and Lyons, and business correspondence in the Netherlands, Italy, Austria, Hungary, and Poland, as well as throughout Germany. In respect to the bulk of the business done by him and of the commercial success secured, he was a greater publisher than either Aldus or Froben, his two most famous contemporaries. The greatest publisher of this period, however, taking into account not simply the commercial returns of his business, but his influence upon the literature and, one may say, upon the civilization of his time, was Aldus Manutius of Venice. It was to the high scholarly ideals and courageous and unselfish labors of Aldus and his immediate successors, no less than to the imagination, ingenuity, and persistency of Gutenberg and Fust, that the Europe of 1495 was indebted for the great gift of the poetry and of the philosophy of Greece. Mainz and Venice joined hands to place at the service of the scholarly world the literary heritage of Athens. The work of Aldus as a printer-publisher (his earlier years had been devoted to teaching) began in the noteworthy year 1492. His first publication was the Greek and Latin grammar of Lascaris. This was followed shortly by the works of Aristotle, a Greek grammar, and a Greek-Latin dictionary. From 1480 to 1509, when the Republic came to be harassed by the war inaugurated by the League of Cambrai, Venice was the most active literature-producing centre in Europe. In the organization of his printing and publishing business, Aldus had special obstacles to overcome. A large proportion of his undertakings were issued in Greek; and while he could secure the service of Greek editors, his compositors were of necessity Italians. He was obliged, after supervising the founding of the type, to watch typesetting and proof-reading. To the text his contributions as an editor were often important. When the book was printed, the copies had to be disposed of by personal correspondence with scholars throughout Europe, to whom the knowledge that Greek classics were obtainable in printed form came but slowly, and with whom grew still more slowly the interest in such classics and the knowledge needed for their study. The delivery of books from Venice to different points of the Continent, particularly during the years of war (and these years were the most numerous), and the securing of the remittances in payment, was by no means an easy matter. It is not surprising that Aldus died poor, or that he writes plaintively in 1510 that "for seven years books had had to contend against arms." His most famous editorial associate was Erasmus, for whom also he published the first editions of the famous *Colloquies* and *Praise of Folly*. A serious difficulty with which the books of Aldus had to contend was the competition of the piratical copies of his editions which promptly appeared in Cologne, in Tübingen, in Lyons, and even so close at home as Florence.

In 1589 the guild of the printers, publishers, and booksellers of Milan was organized. The Stationers' Company in England had secured its

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charter from Queen Mary in 1556, 33 years earlier. Like most of these trade guilds, its object was to restrict the trade to a certain privileged class, the professed aim being "the removal of great and detestable heresies," and the charter ordering "that no man should exercise the mystery of printing, except he was of the stationers' company, or had a license." The guild of the Venetian printers dated from 1548, and was the earliest association of the kind in Europe. The guild of Milan was, however, in certain ways the most important of these earlier organizations. It gave an important incentive to printing and to publishing; it secured a high standard for the quality of the work done, and its regulations tended to keep the business in the hands of a good class of men. The guild of printers and publishers in Paris was a direct development of the earlier guild of manuscript dealers, and, as has been stated, constituted a division of the university. The regulations which had controlled the work of the manuscript dealers, and the supervision and censorship of this work, were continued in France for the productions of the Paris printing-presses. The first publishing office in Paris was founded in 1469, at the request of two of the instructors of the Sorbonne, by Gerring, Krantz, and Friberger, from Constance, at that time an imperial city of Germany. The work of these bookmakers was carried on in one of the halls of the Sorbonne. Printed books had, however, been sold in Paris 7 years earlier. It was in 1462 that Fust brought from Mainz a supply of his folio Bible, copies of which he was able to sell for 50 crowns, while the usual price for manuscript work of this compass had been from 400 to 600 crowns. By the close of the century there were in Paris over fifty printing concerns. After Paris, Lyons was the city of France in which the production of printed books secured the earliest introduction and the most rapid development. The printer-publishers of Lyons showed themselves enterprising in more ways than one. They were free from the immediate supervision and control of the authorities of the University of Paris, and, as the history of the Paris press shows, the difficulties placed in the way of publishing undertakings by the bigoted and ignorant censorship of the theologians must have more than offset the advantages usually to be secured in the production of scholarly publications through the facilities of the university and the editorial service rendered by its members. Paris was, however, fortunate in having among its earlier publishers a number of men whose interest in literature was that of scholars as well as of merchants. Gourmont (who established, in 1507, the first Greek press in Paris) and Badius Ascensius had produced before 1530 a long series of important classical works. The printer-publishers whose undertakings were, however, of the largest importance for the world of scholarship were the Estiennes or Stephani. They contributed no less than four generations to the publishing business. The work of the Stephani was carried on under exceptional difficulties—commercial, literary, theological, and political. Their books were, with a few exceptions, edited and supervised by the publishers themselves. No publisher except Aldus has ever contributed to the issues of his press as much original scholarly work as is to be found in the books bearing the imprint of Robert Stephanus. Willem Janszoon Blaeu (q.v.) (1571-1638), his sons and grandsons, also deserve honorable mention among the Netherland publishers.

The name of William Caxton holds an honorable place in the early publishing undertakings, not only of England, but of Europe. The list of the books issued from his press was not very great, and the books themselves were much less important for scholarship or for permanent literature than the first publications of certain of the printer-publishers of the Continent. The fact, however, that through Caxton printing was introduced into England, and that he was the means of first utilizing for English readers the publishing, training, and scholarly interests which had been developed for him in the Low Countries, gave his work a distinctive importance. Caxton's first printing-press was set up in Bruges, and his first seven publications were there issued. The earliest volume printed in Europe in the French language was Caxton's edition of the Burgundian romance *Le Recueil des Histoires de Troye*. It was in 1476 that Caxton migrated to Westminster. His list of publications there was largely devoted to romances more or less similar in character to the book first issued from his press in Bruges. The demand at that time in England, as indicated by the lists of Caxton and of his immediate successors, for the classical and theological works which constituted so important a portion of the earlier publications of Venice, Paris, Mainz, and Cologne must have been much less considerable than abroad. The period of the beginning of Caxton's publishing business in London was one of political excitement and of civil war, and the times were not favorable for the selling of literature.

A publishing business which, while of no great moment from the commercial point of view, exercised an enormous influence on public opinion in Europe, was that instituted in Wittenberg in 1517, at the instance of Luther and Melanchthon. Luther's first publisher was Johann Weissenberger, from Nuremberg, who printed a tract by him at Lanschott, in Bavaria, in 1517, and later in the same year the treatise on the Seven Penitential Psalms. Issues of the Lutheran press in Wittenberg followed each other with rapidity. The pamphlets that went out from this press, reprinted in other places by printers who were in sympathy with Luther's work, secured an enormous circulation. It is difficult at this time to understand how, with all the obstacles which existed at that time in making announcement of publications issued, it proved to be possible to bring these pamphlets into the hands of so many thousands of interested readers. The question was also not merely one of making known their existence, but of overcoming the impediments placed by the Church authorities in the way of their distribution. Thousands of copies were sold in the market-places, not only by booksellers, but by dealers of all kinds, many of whom had never before handled books. Large supplies were distributed by traveling peddlers among readers out of reach of the book-shops and the market-places. These popular tracts met the needs of

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all classes, educated and uneducated, and secured a wider circulation than had heretofore been achieved by any religious works—or, for that matter, by any writings whatever. Luther made no profit from these sales. Every gulden that was paid for the books, every pfennig that came in for the fly-leaves or pamphlets, was at once expended in further printings and in instituting further distributing machinery.

One of the most noteworthy of the printing houses of the Sixteenth Century was that established in 1555 by Christopher Plantin, in Antwerp. His publications were distinguished not only for the perfection of their typography, but for the beauty of the illustrations, chiefly produced by engraving on copper plates. The books produced in the Low Countries, even during the manuscript period, had always been distinguished by their artistic effectiveness. The illuminations in the manuscripts prepared in Bruges and in Liège were the finest that the world had as yet seen. The same interest in the ornamentation of literature persisted in the Low Countries after the printing-press had replaced the work of the *scriptorium*. For a quarter of a century after 1555, Plantin's publishing house was the most considerable in Europe. In 1557 his consignment to the Frankfort Fair comprised no less than 1200 volumes, together with a large assortment of prints from copper plates. The publishing business founded by him continued in the hands of his descendants until 1867, and had thus a continuous existence of nearly three centuries. In 1867 the 'plant' was purchased by the city of Antwerp, and the Plantin Museum was instituted.

The Elzevirs of Leyden and Amsterdam, whose work continued during the century between 1587 and 1688, were the most noteworthy publishers of Holland, and the repute of the books issued from the Elzevir Press has continued to the present day. While the fame of Plantin had rested chiefly on his illustrated volumes, the reputation of the Elzevirs was connected more particularly with the classical publications produced by their press. They had the advantage of a community of scholars whose services could be secured at moderate cost for the editing of the long series of classical texts which bear the Elzevir imprint. Their catalogues presented also the names of a number of contemporary writers whose works have achieved an abiding fame, among them Descartes, Galileo, Grotius, Salmasius, Heinsius, Hobbes, Spinoza, and Molière.

The book trade of Germany was first organized by the institution, in 1480, of a division of the Frankfort Fair for the sale of printed books. For many years before this date, this fair had been the centre of an active trade in many classes of goods, including not only manuscripts produced in Germany, but also those from the Low Countries, France, and Italy. After 1480 the printer-publishers secured an apportionment of space in the buildings assigned for the fair, which was utilized for semi-annual gatherings. It was not only the German booksellers who made use of this machinery. The Estiennes and the other leading publishers of France, Plantin and his associates of Antwerp, the Elzevirs of Holland, and the leading dealers from Italy, all found it to their advantage to be represented there at least once, and frequently twice, a year. From the beginning of the Sixteenth Century Leipzig came into importance as a book-producing and bookselling centre, and the rulers of Saxony took an early interest, through the encouragement of the book trade, and through liberal regulations concerning censorship of the press and a recognition of property rights in the books produced, to further the undertakings of the printer-publishers of Saxony.

In the beginning of the bookmaking industry, it was understood without further specification that the printer was also the publisher of the works coming from his press. Soon, however, we find associated with his undertakings the names of partners, who had nothing directly to do with the book-manufacturing, but who contributed their aid, either for the sake of literary development or for some other motives apart from that of business profit; and in the list of such associates occurred the names of nobles, ecclesiastics, and wealthy scholars. The period of 1650-1764 witnessed the growth of the system of book exchange under which publishers, in disposing of their productions, were obliged to accept in payment the stock of other publishers, so that the market value of books came to be measured in other books. This method, if it did not add very promptly to the receipts of the dealers, had at least the advantage of facilitating the distribution of books and of furthering the organization of the book trade. The first general catalogue of the books offered at the Frankfort Fair was printed in 1564; of the Leipzig Fair, in 1595. Catalogues of individual dealers, however, were published soon after the invention of printing, and more than a score from the Fifteenth Century are still extant, the oldest of which is that of Johann Mentelin (Strassburg, 1469). The operations and results of the Thirty Years' War (1618-1648) had much to do with the transfer of the centre of the book trade from Frankfort to Leipzig, but a large factor in the matter was the increasing intellectual activity of the Protestant States of north Germany, as compared with the southern, which remained under the restrictions imposed by the Catholic authorities. The German publishers and booksellers have all along had the advantage of a more effective organization than that of any other country, under which there has been, with the smallest possible tax on readers, a larger return than elsewhere for the work of writers, and more stable and less speculative conditions for both sellers and purchasers of books. The Leipzig 'fairs' are still held annually; after they ceased to be actual occasions for exposing the books for sale, they were long the scene of the settlement of the year's business, and are still important reunions of all the publishing interests. Every bookseller in Germany, Austria, and Switzerland has a representative in Leipzig, as the centre of the trade for those countries, and an official organ has been published there since 1834; daily since 1867. Other smaller gatherings similar to the Leipzig Fair occur in Stuttgart, for south Germany, and in Vienna, for Austria-Hungary. While the modern trade is nowhere so elaborately organized as in Germany, all the principal European countries have their associations. In England there are

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the Associated Booksellers of Great Britain (1874), the London Foreign Booksellers' Association (1895), and the Publishers' Association (1896). Stationers' Hall, in London, is the headquarters of the business, and the *Publishers' Circular* and the *Bookseller* are its recognized organs. The *English Catalogue* has, since 1835, furnished an annual list of all books published in the United Kingdom. The principal French association is the Cercle de la Librairie, whose organ is the *Bibliographie de la France* (1811). Italy has its Associazione Tipografico-libraria Italiana, publishing the *Bibliografia Italiana.*

The English book trade was finally released from the earlier restrictions in 1738, and began to develop rapidly. A number of Eighteenth Century booksellers have left behind them a reputation for literary as well as business ability. Michael Johnson (1656-1731), father of the great lexicographer, used to travel from town to town with a stock of books which he sold at auction. Andrew Millar (1707-68) was the publisher of Thomson and Fielding, and had a large share in Johnson's Dictionary. Dibdin calls Thomas Osborne (fl. 1738-67) "the most celebrated bookseller of his day." Some idea of the profits of the business in this period may be gained from the statement which in his old age he used to make with pride, that he had been in business more than forty years and was worth more than £40,000. That these profits were not always easily made, is recalled by the story of Osborne's being knocked down by Dr. Johnson with a folio *Biblia Græca Septuaginta* (Frankfort, 1594). His name appears on a number of title-pages as a shareholder with several other publishers, according to the sociable custom of those days, which gradually died out as the spirit of competition gained ground. A late analogy to this method may be found in the history of the 'Friends of Literature,' an association of booksellers which existed from 1805 to 1811, and during that time published a number of large editions, which were for the most part divided among the members, though sometimes other booksellers were allowed to hold shares in these undertakings. Bernard Lintot (1674-1735), the publisher of Pope's Homer, and Robert Dodsley (q.v., 1703-64), with his brother James (1724-97), are also conspicuous figures in this era. The novelist Richardson (q.v.), as a printer, and in 1754 master of the Stationers' Company, has a place here. Charles Rivington (1688-1742) founded the famous house to which he left his name, and gave it the somewhat theological character which it long retained. (See also RIVINGTON, JAMES, and consult Rivington, *The Publishing House of Rivington*, London, 1894.) Thomas Longman (q.v., 1699-1745) founded another business, which, like that of the Elzevirs and Stephani, was continued from generation to generation; and a third dynasty was begun by John Murray (q.v., 1778-1843). The great university presses, the Clarendon (q.v.) at Oxford, and the Pitt (q.v.) at Cambridge, have published a vast number of books, largely classical texts, in a uniformly scholarly manner.

There is some controversy as to the placing of the honor of producing the first book published on the American Continent. It is asserted that a printer subsidized by Mendoza printed the *Spiritual Ladder* of Saint John Climacus in Mexico, in 1532; but a counterclaim is put in for another Mexican publication of seven years later, a *Compendium of Christian Doctrine* in Spanish. A hundred years after the publication of this latter work, we come to the beginning of printing in the English colonies in America. In 1639 Stephen Daye printed the *Freeman's Oath* and an *Almanack* at Cambridge, Mass.; and in the following year appeared the famous Bay Psalm-Book (q.v.), which is now worth more than its weight in gold. This Cambridge Press turned out one book a year for the next twenty-one years. Apart from these origins, the history of publishing and bookselling in America may be divided into four periods: (a) the Colonial period; (b) from the Revolution to 1820; (c) from 1820 to 1860; (d) from 1860 to the present time. The selling of books, mostly imported, was usually combined with that of other wares; thus Benedict Arnold sold books and drugs. The early publishers were all primarily printers, and book-publishing was merely an incident in their business. Most of them published newspapers; a thorough account of their work is given in North, *History and Present Condition of the Newspaper and Periodical Press of the United States*, a part of the report of the Tenth Census (Washington, 1884). The second period was the real beginning of the American publishing business in any modern sense. The first book-trade organization was effected through the efforts of Mathew Carey. The principal object was to introduce annual gatherings similar to the Leipzig book-fairs. Several such meetings were held, the last one in Elizabethport, N. J., this place being selected for the meeting on account of its central position in the inadequate traveling facilities of the time. These book-fairs were succeeded by the 'trade sale,' held twice a year, first in Philadelphia and later in New York; the heads of publishing houses themselves stood on the platform and sold their books only to members of the trade. The system decayed when people who were not legitimate booksellers gained admission, and indulged in reckless underselling and speculation. A final attempt to go back to the 'book-fair' arrangement was made in 1877, but it was too late, and the system quietly died out in the eighties. Throughout the second period, whose production Sydney Smith characterized in his famous question, "Who reads an American book?" the greater part of the business done in the United States consisted in the importation of English books; and in the third, probably more than half the titles comprised in the American catalogues were the works of English authors, reprinted usually (in spite of honorable exceptions) without compensation. This period, however, was really the golden age of American publishing, and witnessed the foundation of a number of the famous houses. The following dates may be given for the foundation of some of the more famous: Methodist Book Concern, 1789; Harper & Brothers, 1817; D. Appleton & Co., 1825; J. B. Lippincott & Co., 1835; G. P. Putnam's Sons, 1836; Little, Brown & Co., 1837; Dodd, Mead & Co., 1839; Charles Scribner's Sons, 1846. Stereotyping was introduced into the United States in 1813, and lithography in 1819. These mechanical improvements, together with the gradual development of transportation facilities, gave a great impetus to the American book

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trade, which, since 1860, has reached enormous proportions. Editions running to several hundred thousand are familiar phenomena of the present day, and may be accounted for not only by the immense increase in the numbers of the reading public, but also by the improvements in advertising methods. See ADVERTISING.

Among the later developments the most notable is the formation, in 1901, of the American Publishers' Association and the American Booksellers' Association, two organizations that cooperate in maintaining the advertised retail price of copyright books, which are now put out at a price about 20 per cent. less than before the formation of these societies.

A large increase in the volume of the English book trade followed upon the foundation of Mudie's Circulating Library, in 1842, its orders frequently amounting to several thousand copies of a single work, and the total number of volumes in it being counted by millions, although the surplus copies of popular books are usually disposed of to smaller libraries when the first demand is over. In this connection it is natural to speak of the practice (common in England throughout the latter half of the Nineteenth Century, and generally abandoned at its close) of publishing nearly all novels originally in three volumes, which largely increased the number of volumes published. The railway bookstall business, conducted for so many years all over England by W. H. Smith & Sons, was another characteristic feature of book distribution in England during the Nineteenth Century. Statistics show a steady increase in the number of works annually published. In 1901 this reached the large total, in the United States, of 5496 new books and 2645 new editions; in England, of 4955 new books and 1089 new editions. The English figures, probably owing to temporary causes, are the lowest for several years: thus the number of new books was 5760 in 1900, and reached 6244 in 1897.

The business of selling books at second hand is a special branch, requiring a large amount of bibliographical knowledge, and bringing in profits frequently out of all proportion to the original investment. It developed to large proportions in the Nineteenth Century, owing to the growth of systematic collection of books, especially first editions. The famous sale of the Duke of Roxburghe's library occurred in 1812. Among the treasures which that library contained was the only known perfect copy of the earliest dated edition of Boccaccio's *Decameron* (Christ. Valdarfer, Venice, 1471). After a spirited competition with Lord Spencer, Lord Blandford purchased it for £2260, a higher price than had ever been paid for a single book. Books of the first printers, especially Gutenberg and Fust, bring enormous prices. One of their Bibles (called Mazarin, from the discovery of the first copy in Cardinal Mazarin's library) brought £2690 in 1873; and eleven years later a splendid copy on vellum was sold for £3900. At the same sale a beautiful Psalter (*Psalmorum Codex*), printed by Fust and Schoeffer in 1459, brought £4950. Caxtons also run high, the *Eneydos* going at £2350 in 1885. Many collectors are, however, satisfied with first editions of comparatively recent writers; the first obscure publications of authors afterwards famous are also in great demand. In 1900 Poe's *Tamerlane and Other Poems* (Boston, 1827), of which only three copies are known to exist, sold for $2050. Other recent noteworthy sales are those of the Pickering edition of Walton's *Compleat Angler*, at $2870; of *The Troublesome Raigne of John, King of England* (1591), at £510; a first folio Shakespeare (1623), at £1720, the record price for this book; and Bunyan's *Pilgrim's Progress*, Part I., first edition, at £1475. The beautiful books from William Morris's Kelmscott Press, usually reproductions of the old masters, are much sought after. In 1901 a Chaucer on vellum (1896) sold for £510.

BIBLIOGRAPHY. Birt, *Das antike Bücherwesen* (Berlin, 1882); Schmitz, *Schriftsteller und Buchhändler in Athen und im übrigen Griechenland* (Heidelberg, 1876); Haenny, *Schriftsteller und Buchhändler im alten Rom* (Leipzig, 1885); Curwen, *History of Booksellers* (London, 1873); Lempertz, *Bilderhefte zur Geschichte des Bücherhandels* (Cologne, 1853-65); Roberts, *The Earlier History of British Bookselling* (London, 1889); Knight, *Shadows of the Old Booksellers* (London, 1865); Andrews, *The Old Booksellers of New York* (New York, 1895); Lawler, *Book Auctions in England in the Seventeenth Century* (London, 1898); Derby, *Fifty Years Among Authors, Books, and Publishers* (New York, 1884); Besant, *The Pen and the Book* (London, 1899); Growoll, *Book-Trade Bibliography in the Nineteenth Century* (New York, 1898); Dibdin, *Bibliomania* (London, 1811); Fitz Gerald, *The Book-Fancier* (London, 1886); Burton, *The Book-Hunter* (New York, 1882); Kapp, *Geschichte des deutschen Buchhändels* (Leipzig, 1886); Thomas, *History of Printing in America* (Albany, 1874); Arber, *Transcript of the Stationers' Registers* (London, 1894).

BOOKWORM. A name given to the larva or grub of several beetles closely related to the death-watch (q.v.). These grubs may feed on the paste, paper, and binding of books. M. Peignot, the French bibliophile, relates that he once found twenty-seven volumes pierced completely through by a single bookworm. See Blades's *Enemies of Books*, chap. vi. Books are liable also to be injured by other insects that do not have a grub stage—for example, the imported cockroach (Blatta) called the croton-bug, a pest introduced from Europe to the United States; the book-lice (Psocidæ); and the silver-fish (Lepisma).

BOOTLAK. See BULAK.

BOOLE, bōōl, GEORGE (1815-64). An English mathematician and writer on logic, born in Lincoln. At the age of 16 he became assistant master in a Doncaster private school, and subsequently established a school of his own in Lincoln. In 1849 he was made professor of mathematics at Queen's College, Cork, where he died. He is best known, perhaps, for his contributions to logic. His first publication on this subject appeared in 1847, under the title, *Mathematical Analysis of Logic*, and was followed in 1854 by a more extensive work bearing the title, *An Investigation of the Laws of Thought on which are Founded the Mathematical Theories of Logic and Probabilities*. The latter work forms a complete exposition of his original method of applying mathematics to logic. According to this method, classes of objects and ideas are denoted by mathematical symbols, to which are applied the ordinary rules of algebra,

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so that the results of logical reasoning may be arrived at by an almost purely mechanical process. Much more valuable, however, are Boole's contributions to mathematics. The modern theory of invariants may be said to date from a memoir published by him in the *Cambridge Mathematical Journal* in 1841, and he was among the first to contribute to the general theory of covariants. His two larger mathematical works, the *Treatise on Differential Equations* (1859) and the *Treatise on the Calculus of Finite Differences* (1860), are standards on their respective subjects. His special contributions were published in several scientific periodicals. A list of these papers may be found in the Royal Society's *Catalogue of Scientific Memoirs.*

BOOM, bōm. A town of the Province of Antwerp, Belgium, about 10 miles south of the city of Antwerp (Map: Belgium, C 3). Its situation at the junction of the Brussels Canal with the river Rupel makes it a place of considerable commercial importance. It has numerous and extensive brick and tile works, breweries, tanneries, shipbuilding yards, rope-works, sail-cloth manufactures, salt-works, etc. Population, in 1890, 14,100; in 1900, 15,700.

BOOM (Dutch *boom*, Ger. *Baum*, tree, beam). A long pole or spar used to extend the foot of certain sails of a ship; as the *main-boom, jib-boom, studdingsail-boom.* Some of the booms are stationary; others are pivoted at one end, the other being controlled by guys or sheets, and others like the studdingsail-booms which are only occasionally used, rig in and out by means of tackles. The space in the waist of a vessel of old type and used for stowing boats and spare spars is called the *booms.* To *boom off* a vessel or boat is to shove it away with spars. The term boom is applied also to a chain of floating logs fastened together at the ends and stretched across a river, etc., to stop floating timber. Hence, the name is adopted in military usage to denote a strong barrier, as of beams, or an iron chain or cable fastened to spars, extended across a river or the mouth of a harbor to prevent an enemy's ships from passing. Such a boom should be protected by a battery or batteries, and the approaches thickly planted with submarine mines. It is considered best to have booms made double, one to stop the way of ships that have penetrated the first. A chain for this purpose was stretched across the Hudson River at West Point during the American Revolution. The Russians effectually closed the harbor of Sebastopol with a boom defense in 1854, thereby preventing the entrance of the English and French ships. This was done partly by sinking some of their own ships, and partly by the laying of booms. Some of the most gallant and daring pieces of work that have been done by seamen have been in connection with blowing up or cutting away booms in order to make a free passage for the vessels of the fleet. During the American Civil War, when Farragut's fleet attacked New Orleans, formidable chains stretched across the river, and, buoyed up by bulks, were first encountered and destroyed. The torpedo-netting of steel wire or rings used to protect a ship from torpedoes which may be discharged toward it, is held suspended 20 or more feet from the ship by means of a series of hinged booms.

BOOMERANG (native name in New South Wales; *bumarin, womurräng,* among the designations for a club). A curved missile of the Australians made of the green wood of the acacia or some other hard tree treated with fire. The

BOOMERANGS AND BOOMERANG-SHAPED CLUBS (In the British and Berlin Museums).

boomerang averages 2½ feet in length and 2½ inches in width, is convex on one side and flat on the other, with a sharp edge along the curve convex. When thrown with a certain movement of the hand (the grasping end is marked by incised lines, etc.), flat side down, convex side forward, this weapon will, after traveling some distance, return in a sort of ellipse almost to the feet of the thrower, who is also able to vary its course considerably. In Australia the shape, use, and power of the boomerang vary greatly —it ranges all the way from a mere toy to a large and powerful war weapon. It is sometimes ornamented in simple fashion. Boomerang-like objects are claimed by some to have existed in ancient Assyria, Egypt, and elsewhere far outside of the Australian area, and Schoetensack (1901) has even claimed certain bone objects belonging to prehistoric man in western Europe as boomerangs; but all this remains to be proved. Of late years the boomerang has been the subject of mathematical and physical experimentation, and an excellent paper by Mr. G. T. Walker, "On Boomerangs," is to be found in the *Philosophical Transactions of the Royal Society* (London, 1897).

BOOMSLANGE, bōm'släng-*e* (Dutch *boom,* tree + *slang,* Ger. *Schlange,* snake). A beautiful South African tree-snake (*Bucephalus Capensis*), so variable that it has furnished several supposed species to zoölogy, and regarded as poisonous, though possessing no venom-glands.

BOONE. A city and the county-seat of Boone County, Iowa, 43 miles north by west of Des Moines; on the Chicago and Northwestern and Chicago, Milwaukee and Saint Paul railroads (Map: Ohio, D 2). It is in a region which abounds in coal, clay, and timber; and has an extensive trade in coal, grain, agricultural produce, live stock, and lumber. The industrial establishments include flour-mills, brick and tile works, potteries, etc. There are also extensive shops of the Chicago and Northwestern

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Railroad. The city has a public library of over 5500 volumes, an opera house, and a hospital. Population, in 1890, 6520; in 1900, 8880.

BOONE, DANIEL (1735-1820). A famous backwoodsman and pioneer. He was born in Bucks County, Pa. About 1752 his family moved to Holman's Ford, on the Yadkin, in North Carolina, where Daniel Boone became remarkably proficient as a hunter and trapper, and, for a time, attended school. He soon became restive under the restraints of civilized society, and, fired by the tales of John Finley, a trapper who had visited the Kentucky River in 1767, entered the wilderness with five companions and spent two years (1769-71) roaming through the unknown forests. His companions were soon captured or killed by the Indians and he himself, together with a brother who had joined him in January, 1770, had many narrow escapes. In 1773 he started for eastern Kentucky with five families besides his own, but was forced to turn back by an Indian attack, and in 1774 served on the frontier during Lord Dunmore's War. In 1775, as agent of a North Carolina company, he built a fort on the site of the present Boonesboro, Ky., whither, soon afterwards, he brought his family. This fort was twice attacked, in 1777, by a large force of Indians, who, however, failed to capture it. Early in 1778 Boone led a party of 30 to the Lower Blue Licks on the Licking River to secure a supply of salt. Here, February 7, he was captured by a band of Indians, who, after taking him to Detroit, finally adopted him and allowed him such freedom that he managed to escape (June 16), and reached the fort at Boonesboro five days later, in time to help defend it (August 8) against an Indian attack. (See BOONESBORO.) He then went to North Carolina, but in 1780 returned, and in 1782 took a prominent part in the 'Battle of Blue Licks.' He lost his Kentucky land through defective titles and moved, about 1790, to the Kanawha River, near Point Pleasant, Va., where he lived until 1795, when he again moved, this time to the Femme Osage settlement, in Spanish territory, about 45 miles west of Saint Louis. From 1800 to 1804, under a commission from the Spanish authorities, he was commandant of the Femme Osage District. After the purchase of Louisiana by the United States he was again involved in litigation, and ultimately lost nearly all his Missouri land. He died, and was buried in Missouri, but in 1845 his remains were reinterred near Frankfort, Ky. Boone has come to be regarded as the typical pioneer. He was bold and venturesome, insensible to fear, remarkably skilled in woodcraft, a fine marksman, and a successful trapper. Personally, he was mild-mannered, quiet, and unassuming. An account of his life, based on his own relation, was written by Filson in 1784. Consult also lives, by J. M. Peck, in Sparks's *American Biography* (New York, 1856); and by W. H. Bogart, *Boone and Kentucky Hunters* (Auburn, 1854).

BOONE, WILLIAM JONES (1811-64) An American clergyman, first missionary bishop to China of the Protestant Episcopal Church. He was born at Walterborough, S. C., graduated at the College of South Carolina in 1829, was admitted to the bar, but relinquished law, and in 1837 was ordained priest of the Protestant Episcopal Church. In 1844 he was consecrated missionary bishop. He was a profound scholar in the Chinese language and literature, translated the Prayer-Book, and was prominent in the revision of the Chinese scriptures.

BOONESBORO, bōōnz'bŭr'ō. A village in Madison County, Ky., on the Kentucky River, about 18 miles southeast of Lexington (Map: Kentucky, G 2). In 1775 Daniel Boone built his first fort here, and later in the year a land office was opened and the first legislature which ever assembled beyond the Alleghanies met here. In April and July, 1777, and in August, 1778, the fort was unsuccessfully attacked by the Indians.

BOONTON, bōōn'ton. A town in Morris County, N. J., 10 miles northeast of Morristown; on the Rockaway River, the Morris Canal, and the Lackawanna Railroad (Map: New Jersey, D 2). It is picturesquely situated among high hills, is popular as a suburban place of residence and a summer resort. The town has large iron-works, rolling-mills, drop-forge works, etc., and there are also important manufactures of agricultural implements, paper, paints, varnish, silk, and rubber. The Jersey City water-works, forming a large lake three miles long by a mile or more in width, are located here. Boonton was started by the establishment of a large factory, in 1831, by the New Jersey Iron Company. In Old Boonton, one mile distant, first settled about 1700, one of the first iron-works and the first slitting-mill in America were built, the latter in 1770. Population, in 1900, 3901.

BOON'VILLE. A town and the county-seat of Warrick County, Ind., 17 miles east by north of Evansville; on the Southern Railway (Map: Indiana, B 4). It is the centre of an agricultural region, in which timber abounds and which contains also valuable mineral deposits, including coal, fire and pottery clay, and some gold. Population, in 1890, 1881; in 1900, 2849.

BOONVILLE. A city and the county-seat of Cooper County, Mo., about 40 miles northwest of Jefferson City; on the Missouri River, here crossed by a fine railroad bridge, and on the Missouri Pacific and the Missouri, Kansas and Texas railroads (Map: Missouri, E 3). It has an important river commerce, and there are manufactures of shoes, flour, carriages, etc. The city has some reputation as a summer resort; is the seat of the State Reform School for Boys; and contains Harley Park, comprising 15 acres. Founded in 1818, Boonville was incorporated in 1839, and is now governed under a charter of 1896, which provides for a mayor, elected every two years, and a city council. Here, on June 17, 1861, the Union General Lyon, with 2000 men, defeated the Confederates under Marmaduke, commanding a somewhat larger force of ill-organized volunteers. Population, in 1890, 4141; in 1900, 4377.

BOORDE, bōrd, ANDREW (c.1490-1549). An English traveler and physician, born near Cuckfield. He was educated at Oxford, and was early received into the order of Carthusian monks at the London Charterhouse. Disliking this rigid life, he went over to France, about 1528, to study medicine. He traveled extensively on the Continent, visiting the leading universities, and eventually reaching the Holy Land. His works comprise mainly the *Introduction of Knowledge* (c.1547), said to be the first printed hand-book of Europe, and to contain the first printed specimens of the Gypsy lan-

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guage; the *Dyetary* (c.1542); *Breuyary of Health* (1547); *Book of Beards* (lost); and *Itinerary of England* (1735). He also issued prognostications, or almanacs. He was known as a wit and merry fellow, and for this reason he had fathered upon him the famous *Scogins Jests*. Consult ed. Furnivall (for Early English Text Society), *The Introduction*, and *Dyetary* (London, 1870).

BOO'SA. See BUSSANG.

BOOSTER. See DYNAMO ELECTRIC MACHINERY.

BOOT. A lengthened variety of shoe, which is among the most ancient articles of attire. Shoes, extending a certain height up the leg, laced, ornamented, and of fanciful colors, were in use by the ancient Egyptians, Greeks, and Romans. A description of these and other varieties of shoes, as well as an account of the trade and manufacture of shoes and boots generally, will be found in the article SHOES, and below will be given a few historical particulars respecting what properly are called boots, meaning by the term leather coverings for both the legs and feet. Different kinds of half-boots were worn by the Anglo-Saxons and Anglo-Normans; and in the reign of Edward IV., if not earlier, the boot proper, with tops and spurs, was established as an article of knightly dress. In the reign of Charles I., a species of boot, exceedingly wide at the top, made of Spanish leather, came into use; and with Charles II. the highly decorated French boot was introduced as an article of Court attire. Meanwhile, the jack-boot, as it is called, had become indispensable in the costume of cavalry soldiers and horsemen generally; and it was regularly adopted in England by William III. and his followers. Strongly made, the jack-boot extended in length above the knee, was wide at the top, had a very high heel, and around the ankle had a flat leather band, by which a powerful spur was attached.

The jack-boot, a form of which is still used in the British Horse Guards and other European cavalry regiments, is almost entitled to be called the parent of the top-boot and other more or less similar styles. Boots with tops of yellow were so commonly worn by English gentlemen in the Eighteenth Century as to become a peculiarity in the national costume. When Philip, Duke of Orleans, and other revolutionists of note affected to imitate English sentiments and manners, they ostentatiously wore top-boots. Early in the Nineteenth Century English gentlemen habitually wore top-boots; but at the present time they characterize the apparel of coachmen, grooms, jockeys, and fox-hunters. The introduction of the Hessian boot as an article of walking-dress tended to break up the general use of top-boots, and, worn over tight trousers, it had an attractive and ornamental appearance. Boots of this shape, as may be seen from engravings, were worn by English general officers in the early part of the Napoleonic wars and somewhat later. At length they were superseded by the well-known Wellington boot, which, as its name signifies, was introduced by the great Duke to be worn under the loose military trousers. This species of boot has, in its turn, been almost entirely abandone in consequence of the universal use of short ankle-boots or shoes. Boots are worn by cavalry and horsemen generally, and also are often to be seen in the rural districts of America and Europe. They may be made of rubber and cloth, and in such form are used extensively by men working in water or damp places.

The word 'boot' is also used to indicate a leather flap fastened to the front or dashboard of a carriage to be drawn up over the lap of the rider as a protection from the rain.

BOOT, BOOTS, or **BOOTIKIN.** A Scottish instrument of judicial torture, formerly used to force confessions from persons accused of crimes, or answers from unwilling or suspected witnesses. Bishop Burnet, in the *History of his Own Time*, and Sir Walter Scott, in his *Old Mortality*, speak of the boot as made of iron: but the Rev. Thomas Morer, in his *Short Account of Scotland*, written from personal observation of the country at a time when the boot was still in use, describes it as "made of four pieces of narrow boards nailed together, of a competent length for the leg, not unlike those short cases we use to guard young trees from the rabbits." One or both legs of the person to be tortured having been placed in this case, wedges were inserted between the limb and the sides of the case, and these wedges were driven down by the executioner with a mall or hammer, questions being at intervals put to the sufferer, until either he gave the desired information, or fainted away, or showed such endurance as satisfied the judges that no answer could be extorted from him. The wedges were commonly placed against the calf of the leg, but Bishop Burnet says he had heard that they were sometimes placed against the shin-bone. When the boot was first used is unknown. After 1630 it is said to have fallen into disuse for about 30 years. It was revived after the insurrection of the Westland Covenanters in 1666, and continued to be used throughout the reigns of Charles II., James II., and during the first years of William III. In 1690 Neville Payne, an English gentleman who was supposed to have entered Scotland on a treasonable mission, was put to this torture under a warrant superscribed by King William, and still shown in the register house in Edinburgh. This is believed to be the last time that the boot was used. Its further use was prohibited by act of Parliament. Under the name of 'Spanish boots,' a similar instrument was used in Germany. Iron boots, which were heated to an unbearable degree, are shown in some museums. Consult Bingham, *Bastille* (London, 1888), for the boot in France.

BOOTAN, bōō'tăn. See BHUTAN.

BOÖTES, bō-ō'tēz (Gk. βοώτης, ox-driver). A constellation near the Great Bear, also called by the ancients Arcturus, although this name is usually applied to the brightest star in it. Boötes is the driver of the Wagon (another name for the Bear), and was said to be the translated Icarus of Attica. As Arcturus, the constellation is regarded as the watcher of the Bear, and the son of Zeus and Callisto (q.v.), who, with his mother, was transferred to the stars.

BOOTH (Icel. *būf*, MHG. *buode*, Ger. *Bude*, AS. *būan*, to dwell). An unpretentious or temporary structure, either a dwelling or hut of boughs or canvas, or a tent. The name came to be used especially of the stalls or tents at fairs for the installation and sale of wares, for shows, or refreshments. Throughout Europe, in mediæval and later times, trade was carried on

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chiefly by fairs, as is still the case in many regions. Then booths were set up in the main square of the town, or just outside the walls, in improvised streets. The term was afterwards applied to a fixed stand or shop in the market-place for the weekly market day, and also to the permanent shops or warehouses. The religious and civil authorities gained considerable revenue from leasing the right to put up such booths. They must be distinguished from the shops that form a part of regular buildings. The porticoes and approaches of churches, the areas of ancient buildings, the spaces in public squares, and on bridges, were in time overcrowded with such booths, which, from being small, one-storied affairs, grew into real houses, with cellar storeroom, with rear workshop, and second-story bedroom. Thus a single apartment with a broad, unglazed show front, closed at night by a double wooden shutter, became the workshop and dwelling of the craftsmen. They sometimes began as 'squatters,' and efforts to dislodge them often led to trouble (e.g. at Bury Saint Edmunds, in 1192). In old London the most famous line of booths was on Cheapside, in Edinburgh on High Street ('the Boothraw'). As in the bazars (q.v.) of the East, the various trades were usually grouped together. In Italy this devoting of special streets to single trades still survives. The *Ponte Vecchio* at Florence has been given over to goldsmiths' booths ever since the Fourteenth Century.

BOOTH. The name of the heroine's husband in *Amelia*, a novel by Fielding. The character is vicious and petty, though somewhat autobiographic.

BOOTH, Agnes (1843—). An American actress. She was born in Sydney, Australia, and first appeared there as a ballet-dancer, but came to California when she was about 14 years old (1858). Her maiden name was Marion Agnes Land Rookes. In 1861 she became Mrs. Perry, in San Francisco, where she continued till 1865, attracting attention especially for her Hermione in *A Winter's Tale*. She came to New York in 1865, and appeared at the Winter Garden. The same autumn, at Niblo's Garden, she played with Edwin Forrest in a series of important rôles, including those of Julie to his Richelieu, and Desdemona and Ophelia. In 1866 she joined the Boston Theatre Company, of which she was a member for several years. In 1867 she was married to Junius Brutus Booth, Jr., its manager. Touring in 1874-76, she became well known as a star. In the spring of 1877 she made a great success as Cleopatra. From 1881 to 1891 she was with the Madison Square Company, among her popular parts being those of Nora in *Esmeralda* and Mrs. Ralston in *Jim the Penman*. Mr. Booth died in 1883, and in 1885 she became Mrs. John B. Schoeffel. After 1891 she left the stage and went to Europe, but upon her return resumed her work for a time, appearing from 1895 to 1897 in *The Sporting Duchess* and other pieces. Consult: Strang, in McKay and Wingate, *Famous American Actors of To-day* (New York, 1896), and Clapp and Edgett, "Players of the Present," *Dunlap Society Publication* (New York, 1899).

BOOTH, Ballington (1845—). The organizer and leader of the 'Volunteers of America' (q.v.). He was born in London, the second son of William Booth (q.v.), founder of the Salvation Army. In 1887 he was sent to the United States with his wife, Maud (born near London, in 1865), and had charge of the work in this country till 1896, when, disagreeing with his father's plan of operations in the United States and Canada, he withdrew from the Salvation Army and organized a similar body under the name of the Volunteers of America. In order to bring the work of the new organization into closer harmony with that of the various churches, he obtained ordination as a presbyter of the Evangelical Church in Chicago. Both he and his wife are fluent writers and eloquent speakers. He published *From Ocean to Ocean* (1890). See Salvation Army; Volunteers.

BOOTH, Barton (1681-1733). A celebrated English tragedian. He was of a Lancashire family, nearly related to Henry Booth, Earl of Warrington, and received a good education under the well-known Dr. Busby at Westminster, where he attracted notice by his acting in a Latin comedy (Terence's *Andria*). He was expected to enter the Church, but on being sent to Trinity College, Cambridge, he ran away in order to go upon the stage. Betterton (q.v.), to whom he applied, refused at first to help him, for fear of offending his family, and he went to Dublin, where he secured an engagement. Returning after some success to London, he was now received by Betterton, and appeared in Lincoln's Inn Fields as Maximus in *Valentinian*. He won immediate recognition. At Drury Lane, in 1708, he received immense applause as the ghost in *Hamlet*, a part in which he is said never to have had an equal. April 14, 1713, he acted Cato in Addison's tragedy, upon which he became quite the rage among the nobility, who vied with each other in placing their carriages at his disposal; and he frequently stayed over night at Windsor, where the Court was then held. This seems to have been in some degree due to the political conditions of the time, since Whigs and Tories both professed the most complete approval of the character of Cato; yet Booth won high critical commendation. Among his greatest parts were Brutus, Othello, and Henry VIII. In 1716 he published *The Death of Dido: A Masque*, and was the author of other poems. In 1728 he retired from the stage. He died at Hampstead, leaving a widow—his second wife, Hester Santlow, herself an actress of reputation. Consult: Victor, *Memoirs of the Life of Barton Booth* (London, 1733); Genest, *History of the Stage* (Bath, 1832); Cibber, "Life and Character of Barton Booth," in *Lives and Characters of the Most Eminent Actors and Actresses* (London, 1753); and Galt, *Lives of the Players* (London, 1831).

BOOTH, Charles (1840—). An English statistician and writer on social questions. He was born in Liverpool, March 30, 1840, and now resides in London, though a member of the business firm of Alfred Booth & Co., Liverpool. His work entitled, *Life and Labour of the People of London*, published in 10 volumes (1891-97), is a storehouse of accurate social facts, dealing chiefly with the people of East London, and has won for him world-wide renown from men of science as well as from practical legislators. Mr. Booth is a Fellow of the Royal Society (F.R.S.), and was president of the Royal Sta-

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tistical Society, 1892-94. He has taken an active part in the agitation in England for old-age pensions, in the support of which he has written three very useful books: *Pauperism: A Picture: and the Endowment of Old Age* (1892); *The Aged Poor, Condition* (1894); *Old-age Pensions* (1899). See OLD-AGE PENSIONS; STATISTICS.

BOOTH, EDWIN THOMAS (1833-93). A distinguished American actor, the son of Junius Brutus Booth. He was born at Belair, Md., November 13, 1833, and early showed his studious temperament. Brought up to the stage by his father, he made his début in Boston in 1849. In 1851 he took his father's place as Richard III. at the Chatham Square Theatre, New York. The next season they went to California, and after his father's return he remained in the West for several years, visiting also the Sandwich Islands and Australia (1854). He returned from California late in 1856, and after a tour in the South made, in Boston (April, 1857), an immense success as Sir Giles Overreach. Shortly afterwards he repeated his triumph in New York. There, also, he became acquainted with Mary Devlin, whom he married in 1860. She died in 1863. It was in 1861 that he first appeared in London, where, after playing Shylock and Sir Giles, he won great popularity as Richelieu. In 1863 he took control of the Winter Garden, New York, and there his productions of *Hamlet* and other Shakespearean plays were famously successful. After the assassination of Lincoln by his brother, John Wilkes Booth, he retired temporarily from the stage, but reappeared in New York in January, 1866. He married, in 1869, Mary McVicker, who lived till 1881. In 1869 "Booth's Theatre" was built, where his success for a time was both artistic and financial; but the panic of 1873 made him a bankrupt. His tours in the years that followed, however, amply restored his fortunes. In 1880, and again in 1882, he visited Europe, and was received with the most flattering distinction. Some time after his return he formed a partnership with Lawrence Barrett, with whom he continued to appear till the death of Barrett in 1891. He himself then retired from the stage. He was generally regarded as the leading American tragedian, and in a few great characters he was without a rival. His Hamlet was probably his most popular rôle, but his Lear and Othello were especially admired, besides other parts already mentioned. He was not a man of imposing bodily appearance, being rather below the medium stature; but his frame was compact, his carriage at once dignified and graceful, his eye piercing, his features grave. He was thoroughly absorbed in his parts, and his voice was under such complete control as to express, upon occasion, any shade of feeling, sentiment, or conviction. His rendering of familiar Shakespearean passages displayed a fine appreciation of their substance, and of the lights and shades of manner and expression by which their full meaning may be brought out. In his private life he was greatly esteemed. He was the founder and first president of the Players' Club, of New York, in the home of which, given by himself, he died, June 7, 1893. Consult: William Winter, *The Life and Art of Edwin Booth* (New York, 1894); Edwina Booth Grossman, *Edwin Booth; Recollections by His Daughter, and Letters to Her and to His Friends* (New York, 1894); Asia Booth Clarke, *The Elder and the Younger Booth* (Boston, 1882).

BOOTH, JAMES CURTIS (1810-88). An American chemist. He was born in Philadelphia, and graduated at the University of Pennsylvania in 1829. He then remained one year at the Rensselaer Polytechnic Institute, and in 1832 went abroad. There were at this time no regular organized student laboratories at German universities, and Booth combined his studies of chemistry at Wöhler's private laboratory at Cassel. After further studies at Berlin, Vienna, and in England, he returned to Philadelphia, where, in 1836, he established a laboratory for instruction in analytical chemistry, the first of its kind in the United States. Many distinguished chemists, such as Campbell Morfit, R. E. Rogers, J. F. Frazer, Thomas H. Garrett, and R. T. McCulloh, were educated at this institution. Mr. Booth was professor of applied chemistry at the Franklin Institute from 1836 to 1845, and was superintendent of smelting and refining in the United States Mint at Philadelphia from 1849 to 1888, in which capacity he experimented with the nickel ores of Pennsylvania, introducing the fusion of that metal with other alloys in the coinage of cents during the year 1857. Among his principal works may be mentioned: *Annual Reports of the Delaware Geological Survey* (1839); *Encyclopædia of Chemistry* (in collaboration with Campbell Morfit, 1850); *On Recent Improvements in the Chemical Arts* (jointly with Campbell Morfit, 1852).

BOOTH, JOHN WILKES (1839-65). The assassin of President Lincoln. For several years he was an actor, but met with indifferent success and abandoned the stage in 1863. During the Civil War, he was a violent secessionist, and toward its close organized a conspiracy first for abducting the President, and later, for assassinating not only the President, but also the Vice-President and the members of the Cabinet. On the night of April 14, 1865, the President attended Ford's Theatre with his wife and several friends. About 10 P.M. Booth approached him unseen, and shot him through the head. Leaping from the box upon the stage, crying out "Sic semper tyrannis! The South is avenged!" he escaped by the stage door, where a horse was held for him. He had reached Bowling Green, near Fredericksburg, Va., before he was overtaken (April 26). Here he took refuge in a barn, and, refusing to surrender, was shot after the barn had been fired. Most of his accomplices were subsequently captured, and four of them, Powell, Atzerodt, Herold, and Mrs. Surratt, were hanged. He was the son of Junius Brutus Booth, and the brother of Edwin Booth.

BOOTH, JUNIUS BRUTUS (1796-1852). An English actor, on his mother's side a relation of John Wilkes, the English statesman. When a boy in London, where he was born, he learned printing, and after studying law, painting, and sculpture, received a commission as midshipman in the navy, but instead of going to sea he turned to the drama. He appeared on the provincial stage, December 13, 1813, and in London, in October, 1815, at the Covent Garden Theatre. Here, within two years, he became a rival of Edmund Kean, whom he greatly resembled,

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though he more than once played Iago to Kean's Othello at Drury Lane. Booth gained great celebrity in Richard III. and Sir Giles Overreach; but he was taken with a fancy for travel, and, in 1821, arrived at Norfolk, Va. He spent most of the remainder of his life in the United States, where he was exceptionally popular, and esteemed by many critics to be the greatest tragedian of his time. Though his range of characters was not wide, the people never tired of the best of them, such as Richard III., Sir Giles, Lear, Shylock, Hamlet, and Iago. He was noted for his eccentricities, which, at times, verged upon insanity; and in acting he was so intensely carried away that the fencing in *Hamlet* and *Richard III.* became duels in which Richmond and Laertes were sometimes compelled to defend themselves in earnest. Consult: Clark, *The Elder and the Younger Booth* (Boston, 1882); and Gould, *The Tragedian: an Essay on the Histrionic Genius of Junius Brutus Booth* (New York, 1868).

BOOTH, Mary Louise (1831-89). An American journalist, translator, and miscellaneous writer. She early devoted herself to writing tales and numerous translations, among the most important of which were About's *King of the Mountains;* Cousin's *Secret History of the French Court* (1859); Pascal's *Provincial Letters;* Gasparin's *Uprising of a Great People* (1861); and *America Before Europe* (1861); Laboulaye's *Paris in America* (1865); and Cochin's *Results of Emancipation* (1862); and *Results of Slavery* (1862). All this work was done before the close of the Civil War, and, in the meantime, she had published a *History of the City of New York* (1859). During the war she maintained a vigorous correspondence with French friends of the Union cause and received encouraging praise from Lincoln, Sumner, and others. She translated also some fairy tales of Laboulaye and Macé, Martin's abridgment of his *History of France* (1880), and part of the original work. An enlarged edition of her *History of New York* appeared in 1861, and a second revision in 1880. Miss Booth was editor of *Harper's Bazar* from its beginning till her death.

BOOTH, Maud Ballington (Charlesworth) (1865—). A leader of the Volunteers of America, wife of Ballington Booth (q.v.). She was born near London in 1865, the daughter of a wealthy clergyman, early became interested in the work of the Salvation Army, and, at the age of 17, left home and became a companion of Miss Catherine Booth in organizing a branch of the Army in Paris. There she remained two years, then went with a party of Salvationists to Switzerland, where, after suffering vicissitudes and even imprisonment, she finally succeeded in establishing a Salvation Army corps. In 1887 she married Ballington Booth, and, in accordance with the custom of the Army, assumed her husband's rank as marshal. In 1896 she withdrew with her husband from the Salvation Army and founded the Volunteers of America, of which he and she are directors.

BOOTH, William (1829—). General of the Salvation Army. He was born in Nottingham, England, April 10, 1829. He became a minister of the Methodist New Connection, 1850; was appointed to hold special evangelistic services until 1861, when, being required to settle in the ordinary circuit work, he resigned and began his labors among the churches as an evangelist. Finding that most of the inhabitants of London attended no place of worship, he began the 'Christian Mission,' 1865, which soon grew to be a large organization formed on military lines, and was in 1878 re-christened the 'Salvation Army' (q.v.). Under this name it has become widely known, and has grown to immense proportions. A weekly gazette, the *War Cry*, established in 1880, has a very large circulation throughout the world. General Booth has published several hymn and music books, *Salvation Soldiery*, and *In Darkest England and the Way Out* (1890), a work proposing ambitious yet practical schemes for alleviating poverty and suppressing vice; and his six eldest sons and daughters are all actively engaged in some branch of the service, while his younger children are in training for similar duties. (See Salvation Army.) His wife, an enthusiastic coöperator (born 1829, died 1890), wrote *Practical Religion, Aggressive Christianity, Godliness*, and *The Salvation Army in Relation to Church and State.* For her biography, consult: Booth-Tucker (London, 1892) and W. T. Stead (New York, 1900).

BOOTH'BY, Guy Newell (1867—). An English novelist. He was born at Adelaide, South Australia, October 13, 1867. He was educated in England, and has traveled through Australia and in the East. His novels, mostly tales of adventure, have been exceedingly popular. Among them are *Beautiful White Devil* (1896); *Dr. Nikola* (1896); *Billy Binks, Hero, and Other Stories* (1898); *Across the World for a Wife* (1898); *Pharos the Egyptian* (1899); *Love Made Manifest* (1899); *Dr. Nikola's Experiment* (1899); *A Sailor's Bride* (1899); *Long Live the King* (1900); and *The Viceroy's Protégé* (1901). See Australian Literature.

BOOTHIA (bōōth'i-ȧ) **FE'LIX.** A peninsula about 150 miles long and with a greatest width of about 50 miles, forming the most northern part of the American continent (Map: Canada, M 2). Toward the south it contracts to a narrow isthmus, while on the north Bellot Strait (q.v.) separates it from North Somerset Island. It was discovered by Sir John Ross during the most famous of his voyages (1829-33), and named after his friend, Sir Felix Booth, the chief contributor to the expedition. It was supposed at the time to reach as far north as Barrow Strait. Near Cape Adelaide, on the west coast, Sir John's nephew, Lieutenant, afterwards Sir, James Clark Ross, first located the northern magnetic pole on June 1, 1831. Consult Ross, *Narrative of a Second Voyage in Search of a Northwest Passage* (London, 1860).

BOOTHIA, Gulf of. An inlet of the Arctic Ocean separating Boothia Felix, in northern Canada, from Cockburn Island and Melville Peninsula (Map: North America, K 3).

BOOTH-TUCK'ER, Emma Moss (1860—). An officer in the Salvation Army. She was born at Gateshead, England, and is a daughter of Gen. William Booth (q.v.), and the wife of Commander Booth-Tucker. She holds the rank of consul in the organization, and exercises joint jurisdiction with her husband in the direction of the Army in the United States. She was in charge of the 'International Training Homes' of the Army from 1880 to 1888.

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BOOTH-TUCKER, Frederick St. George de Latour (1853—). Commander of the Salvation Army in the United States. He was born at Monghyr, Bengal, India, and passed the Indian civil-service examination in 1874. After studying in London (1874-76), he was appointed to an official position in the Punjab, from which, however, he resigned in 1881 to join the Salvation Army. He inaugurated the Indian branch of that organization in 1882 and conducted it till 1891, when he went to London as secretary for the international work. Since March, 1896, he has been in charge of the United States division of the service, with headquarters in New York City. His works include: *Life of Gen. William Booth* (1898); *In Darkest India and the Way Out; Favorite Songs of the Salvation Army.* Commander Booth-Tucker has shown a remarkable executive ability, rare good sense, and tireless energy in his management of the affairs of the Salvation Army in the United States.

BOO'TLE. A town in Lancashire, England, on the Mersey, and the Leeds-Liverpool Canal. Although an independent municipality, it is practically a suburb of Liverpool, which it adjoins on the north. About 110 acres of the Liverpool dock system, including some of the most important docks, are within the boundaries of Bootle. The town was incorporated in 1868. It obtains its water-supply from Liverpool. It owns an electric plant which supplies the current for lighting purposes and for motive power for street railways, which the corporation owns, but leases to the Liverpool corporation. The town maintains numerous parks, public baths, a gymnasium, and an isolation hospital. Among its educational institutions are a technical school, a public library, and a museum. It has foundries and grain-mills. Its increase in population has been very rapid. In 1881 it was about 27,000; in 1891, 49,200; and in 1901, 58,600.

BOOTS AND SADDLES. The bugle or trumpet call for cavalry or light artillery drill or other mounted duties. See Bugle and Trumpet Calls.

BOOTT, Francis (1813—). An American composer, born in Boston, Mass., of English parentage. He studied music in Florence, and became honorary professor in the Academy of Fine Arts. His first work appeared under the name of Telford. Among his songs are Tennyson's *Break, Break, Break;* Longfellow's *Kyrie Eleison;* and Thackeray's *Rose upon the Balcony.* He has also composed a *Mass* for voices and orchestra; *Te Deum; Miserere; Maria Mater; The Sands o' Dee* (Kingsley's poem); and *We Two* to words of Jean Ingelow.

BOOT-TOPPING. In wooden ships not sheathed with copper it was the custom when far away from a dock—particularly in warm climates—to occasionally scrape off the grass, barnacles, and other matter adhering to the side in the vicinity of the water-line and apply a mixture of grease, sulphur, and tar as a temporary protection against worms. This operation was called *boot-topping.* The name is now applied to that portion of the hull of iron and steel ships which is below the load water-line, but above water under ordinary circumstances. It is commonly painted red. The frequent painting of this part of a vessel is not done merely for the sake of appearance, but for preservation as well, the portion of the side which is sometimes wet and sometimes dry being much more liable to corrosion than the plating above or below it.

BOOTY (Ger. *Beute,* Dutch *buit;* cf. Icel. *byti,* exchange, barter, Sw. *byte,* barter, booty). In military usage, the property captured from the enemy. Booty is not recognized officially in the Army of the United States; though prize-money, its naval equivalent, is, anomalously enough, still a prominent feature of naval warfare, the naval blockade in the Spanish-American War (1898) and the battle of Santiago furnishing notable examples. The regulations concerning booty in the British Army are clearly defined, such booty being apportioned as the King, through his advisers, may direct. There are few regiments in the British service that have not among their regimental effects articles of more or less value, such as bric-à-brac, mess-plate, heathen deities, etc., taken from enemies. Booty of a more concrete and valuable description is collected, and afterwards sold, and the proceeds divided. By law, all booty is the property of the sovereign, and may, at his discretion or pleasure, be returned to the enemy or given to the captors. Similar laws obtain with all other European countries. The siege of Peking (Boxer uprising in China, 1900) may be cited as the best illustration of modern booty. After the defenses were rushed, and the city taken, civilians as well as the international troops seized anything and everything worth their while, and carried it away as booty. The peculiar nature of the campaign, however, and the world-wide criticism of the wholesale looting, induced most of the Powers concerned to return the booty to the Chinese Government. See Loot and Prize-Money.

BO-PEEP, Little. The little shepherdess whose story is a never-failing source of interest to the nursery world. The origin of the name and its application are unknown, but Halliwell, in his *Nursery Rhymes,* quotes from a ballad of the Seventeenth Century, which has the couplet:

> "Halfe Englande ys nowght now but shepe,
> In everye corner they playe a boe-pepe."

BOPP, Franz (1791-1867). A German philologist. He was born in Mainz, September 14, 1791, began the study of Oriental languages in Aschaffenburg, and in 1812 went to Paris, where he was encouraged in his labors by Chézy, Silvestre de Sacy, and August Wilhelm von Schlegel. He afterwards visited London, to pursue further the study of Sanskrit, and in 1824 was appointed professor of philology and Oriental literature in the University of Berlin. His first publication, *Ueber das Konjugationssystem der Sanskritsprache* (Frankfort, 1816), proved epoch-making. This was followed by a Sanskrit grammar, a *Glossarium Sanscritum,* and editions of *Mahabhārata,* in the original text, with a translation. His most important labors centred in several fragments of the great Indian epic, the the analysis of the grammatical forms of the different languages of the Indo-Germanic family, through which he became the founder of the science of comparative philology. His great work is a comparative grammar of the Sanskrit, Zend, Armenian, Greek, Latin, Lithuanian, Old Slavic, Gothic, and German (*Vergleichende Grammatik,* etc., Berlin, 1833-52—a second edition, entirely

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recast, was published in 1857, and a third was published after his death in 1868-71). An English translation by Eastwick was published in 3 vols., 1845-50. In his honor the *Bopp-Stiftung*, for the promotion of the study of comparative philology, was founded in Berlin in 1866. His library was purchased by Cornell University. He died October 23, 1867.

BOPPARD, bŏp'pärt (ancient Bodobriga). A town in the District of Saint Goar, Prussia, on the left bank of the Rhine, 9 miles south of Coblenz. It is an ancient and picturesque walled town with dark, narrow streets and mediæval timbered houses. Among its notable buildings are the old castle of the Archbishops of Trèves, the tower of which is now utilized for the law courts; the Pfarrkirche in late Romanesque, dating from the Twelfth Century; the Gothic Carmeliterkirche of the Thirteenth Century containing interesting sculpture and paintings, and the famous hydropathic establishment, the Marienberg, occupying a former Benedictine nunnery. Boppard is of Celtic origin; it was fortified by the Romans as a depot for their slingers, "Balistarii Bodobricæ," and important remains of Roman walls and fortifications exist. Boppard was a free Imperial city in the Twelfth Century, and many councils were held there. Population, in 1900, 5806.

BOR, bōr, PIETER CHRISTIAENSZOON (1559-1635). A Dutch historian, born in Utrecht. He studied history extensively, and in 1615 was appointed historiographer of Holland and West Friesland. His most important work is the *Oorsprong, begin, ende vervolg der nederlandsche Oorlogen* (The Causes, Beginning, and Course of the Wars of the Netherlands, 1679), in the preparation of most of which he had access to the archives of the Dutch States. In style, the work is little more than a monotonous chronicle, but as a source-book it is highly valued.

BO'RA. The north wind of Southern Europe.

BORA, KATHARINA VON (1499-1552). The wife of Luther, daughter of Anna, of the Haugwitz family. She was born at Klein-Laussig, near Bitterfeld, Saxony, on January 29, 1499. When 10 years old, she entered the Cistercian Convent of Nimptsch or Nimbschen, near Grimma. Becoming acquainted with Luther's doctrines, she found herself very unhappy in her monastic life; and finally, along with eight other nuns, whose relatives, like her own, refused to listen to them, she fled from the convent, with the knowledge of Luther and the active assistance of Leonard Koppe, a member of the city council of Torgau on the nights of April 4 and 5, 1523. They arrived in Wittenberg on April 7. Luther took up a collection for them and wrote to their relatives, who declined to receive them. He then arranged for them to live with honorable people. Katharina became an inmate in the house of the burgomaster Reichenbach. Luther, through his friend, Nicholas von Amsdorf, minister in Wittenberg, offered her the hand of Dr. Kaspar Glaz, pastor in Orlamünde. She declined this proposal, but declared herself ready to marry Von Amsdorf, or Luther himself, who had already laid aside his monastic dress, and was living by himself in the deserted Augustinian monastery. There her marriage with Luther took place on June 13, 1525. The ceremony was performed by Bugenhagen, the city pastor, in the presence of a few friends. There was a wedding breakfast the next morning, also, with a small company; but on June 27 there was a more formal celebration of the event, to which Luther's parents, Katharina's companions in flight, and other friends of both parties, were present. In his wife Luther found an affectionate and faithful helpmeet. Six children were born to them: (1) Hans, or Johannes, born June 7, 1526; (2) Elizabeth, born December 10, 1527, died August 3, 1528; (3) Magdalena, born May 4, 1529, died October 20, 1542; (4) Martin, born November 7, 1531; (5) Paulus, born January 28, 1533; (6) Margareta, born December 17, 1534. After Luther's death the Elector of Saxony and Christian III. of Denmark contributed from time to time to Katharina's support. She was involved in the losses and disasters of the Schmalkald War, and was for a while very poor. She fled from Wittenberg to Torgau to avoid the plague, but on the way met with an accident, and sickened and died at Torgau, on December 20, 1552. For her life, consult: F. G. Hofmann (Leipzig, 1845); A. Stein, pseudonym for H. Nietschmann (Halle, 1879; 3d ed., 1886); A. Thoma (Berlin, 1900).

BORACHIO, bô-rä'chô. A base character in Shakespeare's *Much Ado About Nothing*. He is a follower of Don John, and gives the slanderous evidence against the Lady Hero, on which part of the plot hinges. He is the lover of Margaret, the latter's waiting-woman.

BORACIC (bô-räs'ĭk) **ACID.** See BORIC ACID.

BO'RACITE (from *borax*). A magnesium chloroborate that crystallizes both in the isometric and the tetrahedral systems. It is usually white, although sometimes found in gray, yellow, or green shades, due probably to slight impurities. The principal localities in which it is obtained are in the vicinity of Lüneburg, Hanover, in Holstein, several places in France, and in Stassfurt, Prussia, where a massive variety occurs. It has been prepared artificially by Heintz.

BORAGE, bŭr'âj (Low Lat. *borrago*, from *borra*, *burra*, rough hair), *Borago*. A genus of plants of the natural order Boraginaceæ, having a wheel-shaped corolla, the mouth of which is closed with five teeth, and forked filaments, of which the inner arm bears the anther, the anthers connivent around the style, in the form of a cone. The species are few, chiefly natives of the countries around the Mediterranean Sea. The common borage (*Borago officinalis*) is found in waste places in many parts of Europe, and is pretty frequent—perhaps naturalized—in Great Britain, and introduced into various parts of the United States. It is a plant of rather coarse appearance, with a stout, erect herbaceous stem, one to two feet high, somewhat branched; the lower leaves elliptical, obtuse, tapering to the base; the stem, leaves, flower-stalks, and calyx rough with hairs. The flowers are more than half an inch broad, of a beautiful blue color. Borage was formerly much cultivated and highly esteemed, being reckoned among the 'cordial' flowers, and supposed to possess exhilarating qualities, for which it no longer receives credit. The belief in its virtues was at one time extremely prevalent in England, and its use accordingly universal. The flowers were put into

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salads, Gerarde tells us (1597), "to make the mind glad"; and he adds: "There be also many things made of them, used everywhere for the comfort of the heart, for the driving away of sorrow, and increasing the joy of the mind." Like some other plants of the same order, borage contains nitrate of potash (nitre), and is slightly febrifuge. It is mucilaginous and emollient, and has been used in pectoral affections; its leaves impart a coolness to beverages in which they are steeped; and with wine, water, lemon, and sugar, enter into the composition of an English drink called 'cool tankard.' The young leaves and tender tops are pickled, and occasionally used for salad in parts of Europe. The flowers bear an abundance of nectar, and borage has quite a reputation as a bee plant.

BORAG'INA'CEÆ (Neo Lat. *Boraginaceus*, pertaining to Borage; see BORAGE). A natural order of dicotyledonous plants, consisting chiefly of herbs, but also containing a few shrubs and trees. The leaves are generally rough, with hairs which proceed from a thick, hard base, and the whole plant is mucilaginous and emollient. On account of the harshness and roughness of the plant, the name Asperifoliæ has been given to the order. The leaves are alternate and without stipules. The flowers are in spikes, racemes, or panicles which are almost always coiled up, and gradually uncoil and elongate themselves, the flowers expanding in succession. The calyx is 4- to 5-partite, and remains till the fruit is ripe; the corolla, is generally regular, 4- to 5-cleft, imbricated in bud; the stamens rise from the corolla, and are equal in number to its divisions, generally five, and alternate with them. The ovary is 4-partite, 4-celled; the style simple, arising from the base of the lobes of the ovary. The fruit consists of 4, or sometimes of 2, distinct achenia in some cases; the nutlets are often covered with hooked spines. Some botanists have divided the order into several groups, of which *Ehretioideæ*, with a succulent drupe-like fruit, and *Boraginoideæ*, with dry nutlets, are the most important. These are usually grouped together as sections of the one genus. There are about 1200 known species of *Boraginaceæ* embraced in 85 genera. They are natives principally of temperate and tropical climates, and are particularly abundant in the south of Europe and in the temperate part of Asia; Borage, Alkanet, Comfrey, Forget-me-not, and the exquisitely fragrant Heliotrope (qq.v.) are familiar examples. The drupes of some species of Ehretia are eatable. Among the best known genera of this family are *Cordia*, *Borago*, *Heliotropium*, *Cynoglossum*, *Echinospermum*, *Anchusa*, *Alkanna*, *Symphytum*, *Lithospermum*, *Echium*, etc.

BORÅS, bō'rąs. A town of Sweden, situated on the Wiskan River, 36 miles east of Gothenburg. The town has a technical institute and school for weavers, and is a textile centre (Map: Sweden, E 8). Population, in 1901, 15,837. It was founded in 1622 by Gustavus Adolphus.

BORAS'SUS PALM. See PALMYRA PALM.

BORAUEN, bō'rou-ān'. A town of Leyte, Philippines, situated 26 miles from Tacloban. Population, in 1898, 21,290.

BO'RAX (Ar. *bōraq*, *būraq*, Pers. *būrah*), or SODIUM BIBORATE. A substance crystallizing in the monoclinic system. It occurs native as a saline efflorescence on the shores of a series of lakes, covering a large extent of country, in Ladak, Ceylon, Transylvania, Peru, Chile, in Borax Lake, and other places in the vicinity of Clear County, Cal., and in various localities in Nevada. Borax is a clear, white, translucent crystalline compound, soluble in water, and having a pleasant, sweetish taste. It is prepared for commerce as follows: The crude material called *tincal*, from Tibet, Asia, is sent on sheeps' backs over the Himalaya Mountains to Calcutta, and thence to Europe, where it is purified by washing with a solution of sodium hydroxide, dissolving in water, again treating with the caustic alkali to precipitate the earths, then evaporating the solution and allowing the borax to crystallize out. According to some authorities, tincal was brought by caravan beyond China by way of Babylon, Palmyra, to the Mediterranean ports, before the Christian Era. An important source of commercial borax is found in the volcanic rocks of Tuscany, Italy, where the process, invented in 1818, is as follows: Boric acid, either as vapor or solution, is added to a solution of sodium carbonate, which is dissolved in a covered lead-lined vessel, and heated with steam. The solution of borax thus obtained is evaporated until crystals form. The product on the Pacific Coast, which was discovered in 1864 at Clear Lake, and subsequently extended to other localities, is refined in Alameda, where the crude material is dissolved in water, and heated with sodium carbonate in a digester; the resulting solution is drawn into cooling and crystallizing tanks, where the borax forms on steel rods which are suspended in the vats. The product thus obtained is refined by successive crystallizations until the desired degree of purity is reached. The wholesale price in New York, which was 39 cents in 1864, has, in consequence of the production on the Pacific Slope, fallen to 7 cents, the consumption during this period having increased more than 500 per cent. Borax is extensively used for household purposes. It is also employed as a solvent for resins, albumens, fatty acids, and certain organic bodies; also as a detergent, loosening dirt without injury to the finest laces, and as an antiseptic and disinfectant. It also finds extensive application as a flux for the glazing of pottery and chinaware, and in the making of enamels. Its property of dissolving metallic oxides makes it useful in soldering metals. It is used as a flux in certain chemical processes, and as a reagent in chemical analysis. Finally, it is often used in medicine. In 1899, 40,714,000 pounds of borax, valued at $1,139,882, were produced in the United States.

BORCHARDT, bōrk'ärt, KARL WILHELM (1817-80). A German mathematician, born in Berlin. He studied at the University of Berlin and at that of Königsberg, under Jacobi, and in 1848 became a lecturer in the University of Berlin. In 1856 he was made a member of the Academy of Sciences, and assumed the editorship of the *Journal für die Reine und Ungewandte Mathematik*. His studies regarding determinants were particularly valuable. His complete works have been edited by G. Hettner under the auspices of the Academy of Sciences (Berlin, 1888).

BORCHGREVINK, bōrk'gre-vĭnk, CARSTEN EGEBERG (1864—). A Norwegian scientist and

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explorer, born in Christiania. He studied there and at the Royal Saxon School of Forestry, Tharandt, and in 1888 emigrated to Australia, where he was a surveyor in New South Wales and Queensland, and an instructor in languages at Cooerwell College, New South Wales. In 1894-95 he accompanied a whaling expedition to the South Seas, and in 1895 presented to the Sixth International Geographical Congress, assembled in London, the results of his observations within the Antarctic Circle. On August 22, 1898, he set sail from London for the South Pole, in command of the *Southern Cross* expedition, organized by Sir George Newnes, proprietor of the *Westminster Gazette* and the *Strand Magazine*. He effected a landing at Camp Adare, South Victoria Land, on February 17, 1899, erected a station, and spent nearly a year there in exploration and scientific investigation. (The *Southern Cross* was sent to New Zealand on March 2, 1899, and returned on January 28, 1900.) The expedition mapped the coast about Robertson Bay; discovered a new island, which was named after the Duke of York; studied Antarctic flora and fauna; found the south magnetic pole to be in (approximately) latitude 73° 20′ S., and longitude 146° E., and with sledges reached the 'furthest south'—latitude 78° 50′. Consult: Borchgrevink, *First on the Antarctic Continent* (1901).

BORDA, bôr'dâ', JEAN CHARLES (1733-99). A French mathematician, born in Dax, France. In 1756 he was made associate member of the Academy of Sciences for a paper on the movement of projectiles. In 1771 he was associated with Verdun de la Crenne and Pingré in proving the accuracy of chronometers. He also devoted much attention to the subject of ship-building, and suggested important improvements in the form of vessels. Along with Delambre and Méchain, he was a leading member of the French commission intrusted with the measurement of the meridian arc comprised between Dunkirk and Barcelona. He rendered essential service in the commission on the new system of weights and measures. He invented a new instrument for measuring the inclination of the magnetic needle; and his corrections of the seconds pendulum are still in use. He is best remembered, however, for his improvement of the reflecting circle, on which instrument he published a work in two volumes, *Description et usage du cercle à réflexion* (Paris, 1787).

BORDE, bôr'de, ANDREW. See BOORDE, ANDREW.

BORDEAUX, bôr'dô' (anciently, Lat. *Burdigala*, from, perhaps, a Celtic or Iberian source). One of the most important seaports of France, seat of an archbishop, and capital of the Department of Gironde (Map: France, F 7). It is beautifully situated in a plain on the left bank of the Garonne, about 60 miles from its mouth in the Atlantic. Ships of more than 1000 tons burden can easily ascend the river at high water to Bordeaux, which is accessible at all times to vessels of 600 tons. Its harbor is capacious, and counts a floating dock among its many facilities. Next to Havre, it is the chief port for the transatlantic trade, and is an important centre of the French cod-fishing ships for Newfoundland and elsewhere. The river is crossed by a noble bridge of 17 arches, 532 yards in length, erected by the elder Deschamps in 1811-21. The old town, consisting partly of high wooden houses of the Fifteenth Century, has narrow, crooked streets; but the newer parts of the city and the suburbs have wide streets, fine squares, and pleasant promenades lined with trees. The Cathedral of Saint André, which was consecrated in 1096, is remarkable for its beautiful towers, 160 feet high. The Church of Sainte Croix is a Romanesque basilica of the Tenth Century; that of Saint Seurin is also very old. The former archiepiscopal palace is used as a town hall. The university numbers 100 professors and 2000 students. The city possesses a public library of about 200,000 volumes and 1384 MSS., including a MS. copy of Montaigne's essays.

The principal branches of industry include the production or manufacture of sugar, brandy, liquors, vinegar, nitric acid, printed calicoes, woolen goods, carpets, hats, paper, earthenware, glass bottles, metallic wares, and resinous articles. The rope works, cooperages, and dockyards are extensive and full of activity. The Canal du Midi, connecting Bordeaux with the Mediterranean, enables it to supply the whole south of France with the colonial produce which it imports; and also with English tin, lead, copper, coal, dyestuffs, herrings, etc. Wine, brandy, vinegar, dried fruits, hams, turpentine, and glass bottles are among its principal exports.

Except the wines of Champagne, no French wines are so much exported to foreign countries as those grown in the district of Bordeaux and known as Bordeaux Wines. Some of them are red (known in England as *claret*), others white. Of the red wines, Médoc is one of the best known. The red wines produced by the vineyards of Château-Lafitte, Château-Latour, Château-Margaux, and Haut-Brion are particularly celebrated for their quality. The white wines of Graves and those of Sauternes, Barsac, Preignac, and Langon are in highest repute. Population, in 1896, 256,906.

In ancient times Bordeaux was called Burdigala, and was the capital of the Bituriges Vivisci. It was a very prosperous town in the time of the Romans; was made by Hadrian the capital of Aquitania Secunda; and was both the principal emporium of the southwest of Gaul and the seat of its best educational institutions. It was taken by Charles Martel in 735, and was plundered by the Northmen in the Ninth Century. It became the capital of the Duchy of Guienne, and in 1152 passed, by the marriage of Eleanor of Guienne with Henry of Normandy (afterwards Henry II. of England), under the dominion of England. Bordeaux was for a considerable time the seat of the splendid Court of Edward the Black Prince. During the Revolution Bordeaux was the principal seat of the Girondists, and suffered fearfully at the hands of the Terrorists. Its inhabitants were the first to declare for the Bourbons in 1814. During the Franco-Prussian War a delegation of the Government of National Defense, retreating before the advancing German Army, stationed itself, December, 1870, at Bordeaux, and the first sittings of the National Assembly were held there in 1871. Rosa Bonheur was born in Bordeaux. See: Lourget, *Documents relatifs au port de Bordeaux* (Bordeaux, 1889); Jullian, *Histoire de Bordeaux depuis les origines jusqu'en*

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1895 (Bordeaux, 1895); Mauriac, *L'assainissement de Bordeaux* (Bordeaux, 1890).

BORDEAUX, DUC DE. See CHAMBORD, COMTE DE.

BORDEAUX, UNIVERSITY OF. A university founded in 1441, while Bordeaux was under British rule, by combining earlier convent and cathedral schools and a school of medicine. Its privileges, confirmed by Louis XI., made it self-governing till the time of Francis I. Thenceforward it was under State control. At the Napoleonic reform of the universities, in 1808, it received faculties of science and of letters, in 1870 a faculty of law, and in 1878 a faculty of medicine and pharmacy. It has a budget of over 1,000,000 francs, and had, in 1901, 2088 students, of whom over 800 were in medicine and over 700 in law. In the library there are about 85,000 volumes. Connected with the university is the Marine Zoölogical Laboratory of Archachon.

BORDEAUX MIXTURE. See FUNGICIDES.

BOR'DENTOWN. A city in Burlington County, N. J., 6 miles southeast of Trenton, the terminus of the Delaware and Raritan Canal, and on the Delaware River and the Pennsylvania Railroad (Map: New Jersey, C 3). It contains the Bordentown Military Institute, Saint Joseph's Convent, and the Priscilla Braislin School for Girls. The city is the market and shipping point for a tributary agricultural district, and has extensive manufacturing interests, represented by worsted-mills, machine-shops, and iron-works of various kinds, ship-yards, brick-yards, and other industrial plants. Bordentown was incorporated first in 1849. The government, under a charter of 1876, is vested in a mayor, elected every two years, and a municipal council. Population, in 1890, 4232; in 1900, 4110. Near Bordentown Joseph Bonaparte (q.v.) lived 1817-32, and 1837-39; his fine park, and "Ironsides," the home of Rear-Admiral Charles Stewart (q.v.), are among the city's more notable points of interest. Prince Murat, the son of Marshal Joachim Murat (q.v.), also lived here for many years prior to 1848. See E. M. Woodward, *Bonaparte's Park and the Murats* (Trenton, 1879).

BORDER (Fr. *bordure*, edge, of Teutonic origin; cf. MHG. *borte*, border), THE. A term employed in historical as well as popular phraseology to signify the common frontier of England and Scotland. The Border shifted to and fro frequently in former times. At present the dividing boundary of the two countries consists of natural and imaginary outlines. It is customary to speak of Scotland as a country 'north of the Tweed'; but the Tweed is the boundary only for about 16 to 18 miles. At Carham Burn the line proceeds toward the Cheviot Mountains, which form the boundary for about 25 miles; thence it strikes Kershope Water, a tributary of the Esk. That river is the boundary for a number of miles, to a point above Longtown, where the line quits the Esk abruptly in a northern direction, and taking into England part of what was known as the 'Debatable Land' (q.v.), strikes on the small river Sark, which is the boundary to the Solway Firth, the great natural division on the west. Such, in general terms, is the entire boundary, extending from sea to sea for about 100 miles. The counties lying on the English side of the border are Northumberland and Cumberland; on the Scottish side, Berwickshire, Roxburgshire, and Dumfriesshire.

From the Eleventh till the end of the Seventeenth Century, there was almost constant disturbance on the Border. Ruthless wars on a great scale between English and Scots sometimes caused the most frightful devastation, and became the source of lasting ill-will on both sides. History abounds in events of this kind, and the feuds and forays of clans and families are commemorated in a series of ballads, immortalized in the *Minstrelsy of the Scottish Border*, by Sir Walter Scott.

In the present day there is nothing to distinguish the Border from other districts of the country, unless it be the prevalence of picturesque ruins of old castles, which are generally roofless, but whose walls, of vast thickness and strength, are still in a good state of preservation. The Border strongholds were of three kinds—regular fortresses, large baronial castles, and the lesser kinds of towers. For an account of these and other architectural remains on the Border, see *Border Antiquities of England and Scotland*, by Sir Walter Scott (2 vols., folio, illustrated with plates); also Billings's *Baronial and Ecclesiastical Antiquities of Scotland* (4 vols., 4to), illustrated with plates (Edinburgh and London, 1848-52).

The great channels of communication across the Border are two railway routes, one by way of Berwick and the other by Carlisle. There are also good roads in various directions for those who wish to explore this extremely interesting district. Besides the books already referred to, there are works of local note, among which the most comprehensive are: Richardson, *Romance of English and Scottish Border* (Newcastle-on-Tyne, 1846); Jeffrey's *History and Antiquities of Roxburgshire*, 3 vols. (London, 1857-64); Ridpath's *Border History*, 1 vol., 4to (London, 1776); Veitch's *History and Poetry of the Scottish Border* (Glasgow, 1877); Craig-Brown's *History of Selkirkshire* (Edinburgh, 1886); Oliver's *Upper Teviotdale and the Scots of Buccleugh* (Edinburgh, 1887).

BORDER MIN'STREL, THE. See SCOTT, SIR WALTER.

BORDER RUFFIANS. In American history, a name applied to the pro-slavery residents of Missouri, who, in 1854 and thereafter, crossed over into Kansas for the purpose of turning the elections and of committing depredations on the 'Free-State' settlers. See KANSAS.

BORDER STATES. In American history, the name applied to those slave States which, at the outbreak of the Civil War, were contiguous to the more southerly of the free States. They were Delaware, Maryland, Virginia, Kentucky, Missouri, while North Carolina, Tennessee, and Arkansas were also frequently so designated. Of these, Virginia, North Carolina, Tennessee, and Arkansas seceded and joined the Confederacy.

BORDER WAR. The war in Kansas between the 'Sons of the South,' or pro-slavery men, mostly from Missouri, and the 'Free-State Men,' mostly from the New England States, who had emigrated to Kansas for the purpose of excluding slavery therefrom. It continued for several years after the passage of the Kansas-

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Nebraska Act (q.v.) in 1854. See article on KANSAS. Consult, also, Thayer, *The Kansas Crusade* (New York, 1898).

BORDIGHERA, bōr'dē-gā'rä. A winter resort in the Province of Porto Maurizio, Liguria, north Italy, on the Riviera, overlooking the Mediterranean, 91 miles southwest of Genoa and 7 miles from the French border (Map: Italy, A 4). It was first brought into general notice by Ruffini's novel, *Dr. Antonio*, and has beautiful villas, good hotels, and a splendid promenade, the Strada Romana, which runs through pine and olive groves on the high ground back from the sea. The situation is picturesque, the drinking-water excellent, and the climate agreeable. Snow falls only quadrennially, the average number of rainy days in the year is 45, of cloudy days 100, and the average winter temperature is 53° F. Bordighera is famous for its roses, carnations, anemones, etc., and for the palm branches with which it supplies churches on Palm Sunday. The new museum contains a small library and a unique collection of Riviera flora and of minerals. There are English physicians, an English church, and a theatre that produces operettas and comedies. The popularity of Bordighera with the English is heightened by the fact that members of the English royal family have visited it often. It suffered severely in the earthquakes of 1887. Population, in 1881 (commune), 2556; in 1901, 4673. Consult Miller, "Bordighera, Past and Present," in the *Westminster Review*, Vol. CLIV. (London, 1900).

BORDONE, bōr-dō'nä, PARIS (1500-71). A Venetian painter, born in Treviso. He was a pupil of Titian, whom he imitated so successfully that their works have sometimes been confused. He is ranked next to Titian among Italian portrait painters, and was especially successful in female portraits. At the invitation of Francis I., he went to France in 1538, and there painted the portraits of the King and of the most distinguished members of the Court, returning to Venice in 1540, via Augsburg, where he painted in the Fugger Palace. His chief work is the decoration of the dome of the Church of San Vicenzo in Treviso. Among his noteworthy pictures are: "A Fisherman Presenting the Ring of Saint Mark to the Doge," in the Venice Academy, which in composition and brilliancy of color ranks among the greatest masterpieces of the Venetian school; "Prophecy of the Tiburtine Sibyl," in the Palazzo Pitti, Florence; "Combat of Gladiators," in the Vienna Museum; and "The Chess Players," in the Berlin Museum.

BORDURE, or **BORDER**. See HERALDRY.

BORE (AS. *bor*, Ger. *Bohr*, auger, gimlet; ME. *bore*, Icel. *bora*, hole). The interior of a gun. In the case of breech-loading guns, the length of the bore is from the front face of the breech-plug to the muzzle. It is also used in place of calibre; but, except in regard to shotguns, this is not now very common. See ORDNANCE; GUNS, NAVAL; and SMALL ARMS.

BORE (Icel. *bara*, a billow caused by wind, Sw. dial. *bår*, a mound), or EAGRE. Names applied to the advancing wall of water caused by the incoming tidal wave in funnel-shaped bays and in the estuaries of certain rivers. The height of this rolling mass of surf increases toward the narrower part of the bay, and the wave is converted into a mass of roaring breakers that are the more pronounced in proportion as the bay is shallower. When the water has reached the head of the bay, and its onward movement has been stopped by the resistance of the land, it remains for a short time as a high tide, and then slowly and smoothly returns to the sea. The tidal range at the head of the Bay of Fundy is said sometimes to exceed 50 feet. The tidal wave causes an advancing breaker in almost every river. The bore in the estuary of the Tsien-Tang-Kiang may be mentioned as the most remarkable example of the phenomenon. The bore of the Amazon occasionally reaches a height of 16 feet. The rivers in India, especially the Ganges, are also celebrated for their bores. (See TIDES.) Consult Darwin, *The Tides* (Boston, 1898).

BO'REAS (Gk. *βορέας*, cf. It. *bora*, Russ. *burya*, Bulg., Serv. *bura*, storm). The north or northeast wind, blowing toward Hellas from the Thracian Mountains, and personified in mythology as the son of Astræus and of Eos, or Aurora, and the brother of Notus, Zephyrus, and Eurus. Boreas was said to dwell in a cave of the Thracian Hæmus, to which he carried Orithyia, the daughter of the Athenian King Erechtheus, who bore him Zetes and Calaïs—employed as the symbols of swiftness—and Cleopatra, the wife of Phineus. According to Homeric fable, he begat, with the mares of Erichthonius, twelve horses of extraordinary fleetness. The rape of Orithyia is said to have been represented on the chest of Cypselus at Olympia, and is found on a number of red-figured vases and on an Acroterion of the Temple of Athena at Delos. Boreas had a sanctuary in Athens for his help in wrecking the ships of Xerxes off Eubœa, and for similar reasons he was worshiped in Thurii and Megalopolis. His cult, however, was general, for Achilles prayed to him, and sacrifices were offered to him by the Ten Thousand Greeks, to say nothing of other allusions in the Greek writers. In art he usually appears as a winged man of wild appearance, with rough, disordered hair and beard.

BORELLI, bō-rĕl'lē, GIOVANNI ALFONSO (1608-79). An Italian physician and mathematician, the founder of the iatro-physical school. He was educated in Florence, and was a professor of mathematics in Pisa and afterwards in Messina. Having taken part in a revolt, he was obliged to leave Messina, and spent the remainder of his life in Rome. He carefully observed the motions of the satellites of Jupiter, then little known, and seems to have been the first to discover the parabolic paths of comets. In his epoch-making work, *De Motu Animalium* (Rome, 1680-81), we find the first attempt to apply the principles of mechanics to the movements of animals. Regarding the bones as levers, in which the power acts between the weight and the fulcrum, he endeavors to calculate the power of muscles from a consideration of their fibrous structure, and the manner in which they are united to the tendons.

BORER. The hagfish (q.v.).

BORER. An animal that bores into the hard parts of other animals, or makes tubular burrows. A tiny sponge of the genus *Clione* perforates an oyster-shell, one of these minute organisms inhabiting each perforation. The method of their action is yet a mystery; it is

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thought, however, to be both chemical and mechanical — i.e. by secretion and by spinules. Many worms are borers, working not only into the soil, but into sponges and like organisms. The crustaceans are said to bore, but this is an error; they burrow rather—e.g. the crayfish in search of water. One of the marine isopods, the gribble (*Limnonia lignorum*), however, is remarkable for the damage it does to wharves and other wooden structures in northern American harbors. But the most important borers are the mollusks, particularly the teredo (q.v.) and the family Pholadidæ. A closely allied family (Gastrochænidæ) have the same habit, the most important being the genera Aspergillum and Gastrochæna. Lithodomus (see DATE-SHELL) is another powerful borer. Lyell, in alluding to the alternate upheaval and submergence of the land on the coast, gives us the following fact: On the coast of the Gulf of Naples, near the ancient town of Puzzuo.i, are three marble pillars rising 40 feet above the water, the remains of an ancient temple whose marble pavement still exists many feet below the surface of the bay. For a distance of 12 feet from the water these pillars are smooth and free from blemish. Then comes a distance of 9 feet, throughout which the marble is perforated with innumerable holes. At the end of each of these perforations may be found the remains of the tiny Lithodomus. The adjacent waters are still filled with the same species. There is a difference of opinion as to the precise manner in which bivalve mollusks bore, but there is little doubt that the foot and adductor muscles afford the motor power and the anterior part of the shell the cutting instrument. Among gastropod mollusks several small species are known as 'borers' along the northern American coast, because of their method of perforating the shells of clams, oysters (resulting in serious annual loss to the oysterculturists), and similar victims. This boring of the shell is made with their rasp-like tongue ribbons, and through the perforation the juice of the victim is sucked out. The chief offender in Long Island Sound and New York Bay is *Urosalpinx cinerea*, commonly called drill. Many worms are borers, perforating sponges, etc. Insects of similar habits are described under BARK-BEETLE; CARPENTER-BEE; and similar titles.

BOREGAT, bôr'ê-găt. A name given to several rock-trouts of the Pacific coast of the United States, especially *Hexagrammus Stelleri*. See ROCK-TROUT.

BORGERHOUT, bôr'gĕr-hout (Dutch *borg*, safety, security + *hout*, wood). An eastern suburb of Antwerp, containing a number of manufacturing establishments and a church noted for its architectural beauty (Map: Belgium, C 3). Population, in 1900, 37,300.

BORGHESE, bôr-gā'zâ. A family of great distinction in the Republic of Siena, and afterwards in Rome. CAMILLO BORGHESE (1552-1621) ascended the Papal throne in 1605 as Paul V., and by him other members of the family were advanced to high positions. A marriage with the heiress of the Aldobrandini brought the family into the possession of great wealth.—CAMILLO FILIPPO LUDOVICO, Prince Borghese (1775-1832), joined the French Army when it invaded Italy; and, in 1803, married Pauline, the sister of Napoleon Bonaparte, and widow of General Leclerc. His wife subsequently received the principality of Guastalla, and he was created Duke of Guastalla, and under the French Empire he was for some time Governor-General of the provinces beyond the Alps. He held his court in Turin, and was very popular among the Piedmontese. He sold the Borghese collection of artistic treasures to Napoleon for 13,000,000 francs, receiving in part payment the Piedmontese national domains; but when these were reclaimed by the King of Sardinia, in 1815, he received back some of the works of ancient art. The remainder are in the Louvre. After the overthrow of Napoleon he separated from his wife and broke off all connection with the Bonaparte family. He lost Guastalla, but retained the principalities of Sulmona and Rossano, his hereditary possessions. His heir was his brother, Francesco Borghese, Prince Aldobrandini (1776-1839), a general in the French service, who was succeeded by his eldest son, Marco Antonio (1814-86). Of the latter's two sons, the elder, Prince Paolo, born in 1845, lost through unlucky speculations the greater part of his fortune, in consequence of which most of the precious collections of the family had to be sold at auction in 1891-92. The valuable family archives were acquired by Pope Leo XIII. for the Vatican. The Borghese Palace is one of the most magnificent in Rome. The noble portico of the inner court is composed of 96 granite columns; the collection of paintings is remarkably fine. By negotiations concluded recently the art treasures of the palace became the property of the Italian Government.

BORGHESE, VILLA. The summer palace of the Borghese family, situated outside the Porto del Popolo, Rome, in an extensive garden, ornamented with artificial ruins and fountains. It was built by Cardinal Scipio Borghese, nephew of Pope Paul V., on the Cenci estate. Many of its former treasures of ancient sculpture were removed to Paris in 1806. The Casino contains the collection of antiques formed to replace those carried off under Napoleon and includes a number of important statues, although some have recently passed out of the possession of the family.

BORGHESE GLADIATOR. A work of Agasias of Ephesus, formerly in the Gorghese collection in Rome, whence the name. By order of Napoleon it was sent to the Louvre, in Paris, where it now is. It is in the Græco-Roman manner, representing a warrior, with shield and sword, in the act of striking. Its date is about the First Century B.C.

BORGHESE MARS. A fine example of ancient sculpture once in the Borghese collection in Rome, now in the Louvre, Paris.

BORGHESI, bôr-gā'zê, BARTOLOMMEO (1781-1860). An Italian numismatist and epigraphist, born at Savignano, near Rimini. His earliest studies were on documents of the Middle Ages; afterwards he turned his attention to Roman numismatics and epigraphy. During the troubled times of 1821 he retired to the little Republic of San Marino, where he made his home until his death. By his publication *Nuovi frammenti dei fasti consolari capitolini* (2 vols., 1818-20), Borghesi established himself as one of the most eminent epigraphists of modern times; indeed, he may be called one of the founders of present-

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day epigraphy. His writings were very numerous. After his death a collected edition was begun at the order of Napoleon III., which has only recently been completed—*Œuvres complètes* (10 vols., 1862-97).

BORGIA, bôr'jâ. An Italian family of Spanish origin which acquired great eminence after the elevation of Alfonso Borgia to the Papacy as Calixtus III., in 1455. He had previously been a councilor of the King of Aragon. He died in 1458.—RODRIGO BORGIA, nephew of the foregoing, ascended the Papal throne in August, 1492, under the name of Alexander VI. (q.v.). Before his elevation to the Papacy, he had a number of children by a Roman woman named Vanozza (Giovanna de' Catanei), of whom the most celebrated were Cesare and Lucrezia.—CESARE or CÆSAR BORGIA was one of the most unscrupulous men of an unscrupulous age. He stopped at no means to advance his ambitious design in Italy. He had early received high ecclesiastical preferment, and his father, soon after becoming Pope, made him cardinal. But on his father's conferring upon his brother Giovanni the Duchy of Benevento, with the counties of Terracina and Pontecorvo, Cæsar, as was believed, caused his brother to be assassinated. He obtained the duchy and counties for himself, and was permitted by his father to resign the purple and to devote himself to the profession of arms. He was sent, in 1498, to France, to convey to Louis XII. a bill of divorce and dispensation from his marriage with Anne of Brittany. Louis rewarded him for the Pope's complaisance with the Duchy of Valentinois, a bodyguard of 100 men, 20,000 livres of yearly revenue, and a promise of support in his schemes of ambition. In 1499, Cæsar married a daughter of the King of Navarre, and accompanied Louis XII. to Italy, where he undertook the conquest of the Romagna for the Holy See. The rightful lords of that region, who fell into his hands, were murdered, notwithstanding that their lives had been guaranteed by his oath. In 1501 he was named by his father Duke of Romagna. In the same year he wrested the principality of Piombino from Jacopo D'Appiano, but failed in an attempt to acquire Bologna and Florence. He took Camerino, and caused Giulio Di Varano, the lord of that town, to be strangled along with his two sons. By treachery as much as by violence, he made himself master of the Duchy of Urbino. A league of Italian princes was formed to resist him, but he kept them in awe by force until he succeeded in winning some of them over by advantageous offers, employed them against the others, and then treacherously murdered them on the day of the victory (December 31, 1502), at Sinigaglia. He now seized their possessions, and seemed to have removed every obstacle in the way of becoming King of Romagna and of Umbria, when, on August 17, 1503, his father died, probably of poison which had been prepared for twelve cardinals. Cæsar, also, who was a party to the design (and who had long been familiar with that mode of dispatching those who stood in the way of his ambition, or whose wealth he desired to obtain), had himself partaken of the poison, and the consequence was a severe illness, exactly at a time when the utmost activity and presence of mind were requisite for his affairs. Enemies rose against him on all hands, and one of the most inveterate of them ascended the Papal throne as Julius II. Cæsar was arrested and conveyed to the castle of Medina Del Campo, in Spain, where he lay imprisoned for two years. At length he contrived to make his escape to the King of Navarre, whom he accompanied in the war against Castile, and was killed on March 12, 1507, by a missile from the castle of Biano. With all his baseness and cruelty, Borgia was temperate and sober. He loved and patronized learning, and possessed in a remarkable degree a ready and persuasive eloquence. Machiavelli, who was at one time dazzled by the energy and ability of Cæsar and believed that he was capable of unifying Italy, has delineated his character in his *Principe*.—LUCREZIA BORGIA, sister of Cæsar Borgia, a woman of great beauty, was born in Rome in 1480. She was married first to Giovanni Sforza, Lord of Pesaro, June, 1493; but her father, ambitious of a more advantageous alliance, annulled this marriage (December 20, 1497), and gave her (June 20, 1498) to Alfonso, Duke of Bisceglie, nephew of the King of Naples. The same motive induced her father and brother to separate her from her new husband, who was assassinated August 18, 1500, by Michelotto, Cæsar's bravo. For the third time free, the Pope's daughter became, in spite of the repugnance of the Duke Ercole d'Este, the wife of the latter's son, Alfonso, who soon after inherited the Duchy of Ferrara. Lucrezia has been represented as placed outside the pale of humanity by her wantonness, her vices, and her crimes, but the recent researches of most accurate and impartial historians have demonstrated that in her youth, with no initiative, no choice permitted to her, she was rather the too pliant instrument in the hands of Alexander and Cæsar Borgia. She died June 24, 1519.

BIBLIOGRAPHY. Creighton, *History of the Papacy During the Period of the Reformation*, 5 vols. (London and New York, 1882-94); Machiavelli, *Historical, Political, and Diplomatic Writings*, 4 vols., trans. by Detmold (Boston, 1891); Villari, *Niccolo Machiavelli and His Times*, 4 vols., trans. by Villari (London, 1878-83); Gilbert, *Lucrezia Borgia* (London, 1869); Symonds, *The Renaissance in Italy: The Age of the Despots*, 7 vols. (London, 1875-86); Burckhardt, *The Civilization of the Renaissance in Italy* (London, 1878); Gregorovius, *Stadt Rom im Mittelalter* (Stuttgart, 1881), also in English translation, and Gregorovius, *Lucrezia Borgia* (Stuttgart, 1875); Leonetti, *Papa Alessandro VI.* (Bologna, 1880); Alvisi, *Il duca Valentino* (Imola, 1878); Yriarte, *César Borgia* (Paris, 1889) and *Autour des Borgia* (Paris, 1893); Maury, "Une réhabilitation de César Borgia," in the *Revue Historique* (Paris, May, 1880).

BORGIA, FRANCISCO (1510-72). A general of the Jesuit Order, born at Gandie, Valencia. His early life was spent at the Court of Charles V., and in 1545, after the death of his wife, he entered the Order of Jesus and was appointed by Loyola vicar-general of the order in Spain and Portugal, which position he held until the death of Lainez, the successor of Loyola. Under his administration numerous reforms were instituted. He was canonized in 1671.

BORGIA, STEFANO (1731-1804). An Italian antiquarian and prelate, born at Velletri. In

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1759 he was appointed Papal Governor of Benevento, and in 1764, by precautionary measures, protected the city and district against an impending famine. He became secretary of the Propaganda in 1780, and, in 1789, cardinal. He was well known for his valuable archæological collection, to which admission was freely granted to scholars, and from which, it is said, he once sold a gold plate to defray the expense of imprinting San Bartolommeo's *Systema Brahmanicum*. He wrote *Istoria della città di Benevento* (1763-69) and other works.

BORGNE (bôrn'y') **LAKE.** An inlet of the Gulf of Mexico extending into the southeast of Louisiana and covering an area 60 miles long by 10 broad (Map: Louisiana, F 3). It is connected by the Rigolet Pass with Lake Pontchartrain, and is used by steamers plying between New Orleans and Mobile.

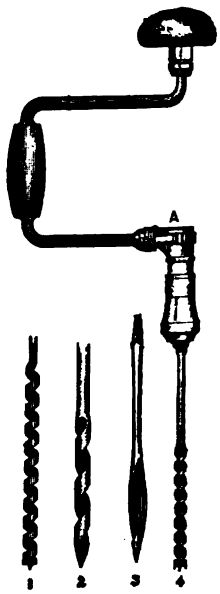
BORGO, POZZO DI. See POZZO DI BORGO.

BORGOGNONE, bôr'gô-nyō'nâ, AMBROGIO (c. 1445-c.1523). An Italian painter, whose real name was Ambrogio Stefani da Fossano. His best work is found in the Certosa in Pavia. The influence of Da Vinci is noticeable in his pictures, the latest undoubted example of which is in San Simpliciano, Milan.

BORGU, bôr-gōō', or **BUSSANGO,** bụs-saụ'gô. A kingdom in Sudan (q.v.), west of the Niger, and bounded by the States of Gurma and Gando on the north, and Chanjo on the south. The country is generally level and supposed to be very fertile. The population is mostly composed of Fulahs and Mohammedans. The principal settlements are Bussang, on the Niger, and Niki, the seat of a British resident. It was near the former place that Mungo Park met his death. At the demarcation of the western boundary line of Nigeria in 1885-86, the eastern part of Borgu was included in the British possession of Northern Nigeria (q.v.). Consult "The Struggle for Borgu," in *Blackwood's Magazine*, No. 65 (London, 1899).

BO'RIC or **BORAC'IC ACID** (from *boron*, or *borax*). A soluble, solid substance that crystallizes in the triclinic system, and is known mineralogically as *sassolite*. It is found in the waters of the Tuscan lagoons of Monte Rotondo, Castelnuovo, and elsewhere; also as an incrustation on sulphur in the crater of Vulcano in the Lipari Islands; it has been found in the borax lakes of California in combination with various elements, as borates. It is also found native. (See BORON.) It was discovered in the Tuscan lagoons in 1777 by Höfer, a Florentine apothecary, who named it *sal sedativum hombergii*. The principal source of its supply is the Tuscan lagoons, the hot vapors from which, consisting largely of boric acid, are passed through water, which absorbs the acid. The acid is then used in the manufacture of borax. Boric acid is a white translucent crystalline compound that is readily soluble in water, and besides its use in the production of borax, is employed for glazing porcelain, in the manufacture of glass and certain pigments, and in preparing the wicks of stearine candles.

BORING MACHINERY. The simplest implement for boring holes in wood is the awl, which displaces the fibres of the wood and leaves a hole without removing the wood to any great extent. For boring small holes of larger size than can be easily bored with awls, gimlets are employed. A gimlet has a conical screw-point followed by a spiral groove for clearing the hole and is fitted with a wooden or metal cross handle or with a square shank for insertion into a bit-stock or brace. For boring larger holes than can be bored with gimlets augers and bits are employed. These tools are too familiar to require description. Bits and augers are operated by hand by means of bit-braces or bit-stocks, or by some simple mechanism operated by power. In recent years pneumatic boring machines have come into extensive use for wood-boring in car-shops, ship-yards, and other places where large amounts of heavy boring are done. These machines are fully described under PNEUMATIC TOOLS. In boring holes in metal and rock the drills used are different from those employed in wood-working; they will be found described under METAL-WORKING MACHINERY and DRILLS.



BRACE AND BITS.
1, Ring-bit; 2, 3, gimlet-bits; 4, auger-bit; A, ratchet-brace.

BORIS GODUNOFF, bô-rēs' gō'dụ-nôf'. A play by Pushkin based on the Russian interregnum.

BORISOVKA, bô-rē'sôf-kâ. A town in the Russian Government of Kursk, situated about 120 miles south of the town of Kursk (Map: Russia, E 4). It has a considerable tanning industry and holds five fairs annually. In the vicinity is situated the Tikhvin-Borisov Convent, founded by Count Sheremetieff in the Eighteenth Century, and the house which Peter the Great occupied during the war with the Swedes. Population, in 1897, 16,400.

BORISSOGLIEBSK, bô-rē'sô-glyĕpsk' (in honor of the two canonized princes, Boris and Gljeb). The capital of a district in the Government of Tambov, Russia, on the left bank of the Vorona, 110 miles southeast of the city of Tambov, and 424 miles southeast of Moscow (Map: Russia, F 4). It is an active commercial town, with good harbor, and contains, among other educational institutions, a school for railway mechanics. From a commercial point of view, Borissogliebsk is situated very advantageously. It is in direct communication with ports on the Azov and Black seas by means of the waterways of Vorona, Khoper and the Don, and is connected by rail with Tzaritzin and the territory on either side of the Volga, on the one hand, and with the ports on the Baltic on the other. Grain, timber, kerosene, fish, caviar, watermelons, destined for Saint Petersburg and Moscow, as well as salt from the lakes of Astrakhan, pass through Borissogliebsk. About 2000 rafts and barks are built here annually and are laden with goods for Rostov and

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Taganrog. Borissogliebsk was founded in 1646 for defense of the frontiers against the incursions of the Crimean Tartars. Population, in 1885, 13,000; in 1897, 22,370.

BORISSOV, bô-rē'sôf. The capital of a district in the Government of Minsk, Russia. It is situated on the Beresina, 50 miles northeast of Minsk, near the place where Bonaparte's army crossed the river Borissov, in 1812 (Map: Russia, C 4). Flour-mills, breweries, and tobacco-factories are the chief industrial establishments of the town. Borissov is known to have existed in the Twelfth Century, and came into the possession of Russia in 1795. Population, in 1897, 14,931, including about 10,000 Jews.

BÖRJESON, bēr'ye-son, JOHAN HELENUS LAURENTIUS (1835—). A Swedish sculptor. He was born in Halland, studied in Rome and Paris, and in 1886 was appointed professor in the academy at Stockholm. His works include genre and ideal subjects, and portrait-statues of various sizes. The following may be enumerated: "The Bowler" (Gothenburg Museum); "Youth with a Tortoise" (National Museum, Stockholm); and the colossal statues of Holberg at Bergen, of Axel Oxenstjerna in the House of Lords, Stockholm, and of King Charles X. Gustavus at Malmö.

BÖRJESSON, JOHAN (1790-1866). A Swedish poet and dramatist, born in the Parish of Tanum. He studied theology at the University of Upsala, and in 1828 became pastor of Weckholm. He published two volumes of poems, *Kärlek och poesi* (1849) and *Blommor och tårar på en dotters graf* (1854); but his reputation rests chiefly on his tragedies. Of these, *Erik den Fjortonde* (Erik the Fourteenth, 1846), is his best, accessible in the German rendering of Winterfeld (1855). His collected works were edited by Dietrichson (Stockholm, 1873-74).

BORLAND, SOLON (1811-64). An American soldier and politician. He was born in Virginia, but early removed to Arkansas. He served as major of volunteers during the Mexican War, was in the United States Senate from 1849 to 1853, and in 1853-54 was Minister to Central America. While returning to the United States (1854), the inhabitants of Greytown tried to arrest him for having aided an accused person, and, by order of the United States Government, the town was bombarded by Commander Hollins. In the spring of 1861, before his State had seceded, he organized a body of troops, and, in the name of the Southern Confederacy, took possession of Fort Smith, Ark. Later he was made a brigadier-general in the Confederate Army.

BORLASE, bôr'las, WILLIAM (1695-1772). An English antiquary, born at Pendeen. He graduated at Exeter College, Oxford, and in 1720 was ordained priest. In 1722 he became rector of Ludgvan, and in 1732 he received the vicarage of Saint Just. He was a close student of the antiquities and natural history of Cornwall, and published as the first result of his researches the essay on *Spar and Sparry Productions* (1750). His most important work was his *Antiquities of Cornwall* (1753)—a collection of learned and original essays, followed in 1756 by *Observations on the Ancient and Present State of the Islands of Scilly.* He published, in 1758, a *Natural History of Cornwall.* He was a friend of many contemporary men of letters, including Pope, for whose Twickenham grotto he supplied most of the mineral and fossil decorations.

BORMANN, bôr'mân, EDWIN (1851—). A German poet and song-writer. He was born in Leipzig, and educated at the Polytechnic School, Dresden, and the universities of Leipzig and Bonn. His first literary work was a series of humorous sketches in dialect, contributed to the *Fliegende Blätter.* He is also the author, in High German, of a book of humorous songs, entitled *Seid Unschlungen Millionen* (1879), and also *Schelmenlieder* (1891), *Das Buchlein von den Schwartzen Kunst* (1886); *Liederhort in Sang und Klang, in Bild und Wort* (1888), and *Klinginsland, Minnelieder und Spielmanns weisen, alten Meistern nachgesungen* (1891).

BORMANN, bôr'mân, EUGEN (1842—). A classical philologist, professor of ancient history and epigraphy in Vienna, author of *Fastorum Civitatis Tauromenitanæ Reliquiæ Descriptæ et Editæ* (1882); *Inscriptiones Æmiliæ Etruriæ Umbriæ Latinæ* (1888). He is also a corresponding member of the Imperial Academy of Sciences, Vienna, and was one of the assistant editors of the *Corpus Inscriptionum Latinarum.*

BORMIO, bôr'mē-ô (Ger., Worms). An antiquated town in the Province of Sondrio, north Italy, 4020 feet above the sea, in the upper valley of the Adda, at the south entrance of Stelvio Pass (q.v.) (Map: Italy, E 1). The nearest railway station is at Sondrio, 44 miles to the southwest, which is 25 miles east of Colico, on Lake Como. Two miles northwest of Bormio are the New Baths (Bagni Nuovi di Bormio), 4380 feet above the sea, which are frequented by tourists in July and August. The water is piped to the establishment from seven salt and sulphur springs (100°-105° F.) that rise in the cliffs near the Old Baths, 4750 feet above the sea. These springs were mentioned by Pliny and by Cassiodorus, and the old Roman baths (*piscinæ*) hewn in the rock can still be seen. The water is prescribed for rheumatism, gout, and kindred diseases. Population, in 1881 (commune), 1800; in 1901, 1814. Consult: Killia, *Rhätische Kurorte und Mineralquellen* (Chur, 1883).

BORN, bôrn, BERTRAND DE (1140-1215). A French soldier and troubadour, who traced his descent from the dukes of Aquitaine. He was born at the Castle of Born in Périgord. Born fought with his brother for the family possessions, and defeated him. But Richard the Lion-hearted sided with his brother and deprived Born of his possessions. He is generally represented as a breeder of dissensions, and especially as embittering the strife between Henry II. of England and his sons. Dante refers to this in the *Inferno* (XXVIII.). In the latter part of his life, Born entered the Monastery of Dalon, and is supposed to have joined the Cistercian Order. He wrote some poems of love and war, which breathe the spirit of a passionate man. There are two complete editions of his works edited by Albert Stimming (Halle, 1879), and A. Thomas (Toulouse, 1881). See Maurice Hewlett's novel, *Richard Yea-and-Nay* (1900).

BORN, bôrn, IGNAZ VON (1742-91). An Austrian mineralogist and metallurgist, born in Karlsburg, Transylvania. He studied law in

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Prague, and went into the Department of Mines there in 1770. In 1776 he went to Vienna and took charge of the Imperial mineralogical collections. Against much opposition he succeeded in substituting amalgamation for smelting and cupellation for extracting silver from the ores in the mines of Hungary, and also introduced other practical improvements in mining, salt-working, and chemical bleaching.

BÖRNE, bĕr'ne, LUDWIG (1786-1837). A German political pamphleteer and satirist, born in Frankfort-on-the-Main. He renounced his Hebrew faith and name (Löb Baruch), and published various political journals that were successively suppressed, of which the best known is *The Balance* (*Die Wage*). He was an able and caustic critic of the political condition of Germany, and after the *Wage* was discontinued (1821), led a restless life in Paris, Heidelberg, Frankfort, Berlin, and Hamburg. After the July Revolution he returned to Paris (1830), where he established the *Balance*, for the purpose of promoting a closer intellectual union between France and Germany. He is now best remembered for his dramatic criticism and for a bitter controversy with his fellow-exile Heinrich Heine. His collected *Works* appeared in 1863. His best-known satire is *Menzel der Franzosenfresse*. His *Denkrede auf Jean Paul* is famous for its beauty of thought and style. Consult: Heine, *Ueber Börne* (Hamburg, 1840); and Holzmann, *Leben Börnes* (Berlin, 1888).

BOR'NEËNE. See BORNEOL.

BORNEIL, bôr'nâ'y', GIRAUD DE. A French poet belonging to the close of the Twelfth Century. He was born at Exideuil (Dordogne), and won high rank for his verses. Mention is made of him in the *Purgatory* by Dante, who also, in the *De Vulgari Eloquio*, classes him with Arnaut Daniel and Bertran de Born. Of his work there have been preserved eighty-two specimens, many satiric, most of them obscure.

BORNEMANN, bôr'ne-mân, FERDINAND WILHELM LUDWIG (1798-1864). A German jurist. He was born in Berlin, and studied jurisprudence there. In 1848 he became Minister of Justice in the Camphausen Ministry, and in the same year second president of the Superior Court at Berlin. In 1849 he was elected to the First Chamber of the Prussian Diet, and in 1860 he became a member of the House of Peers. He is known as one of the most eminent authorities on Prussian civil law, of which his *Systematische Darstellung des preussischen Civilrechts* (1834-39) was the first adequate presentation.

BOR'NEO (corrupted from *Brunai*, Malay *Burni*, *Būrnī*, a district, the island having no comprehensive native name, though sometimes called *Pulo Kalamantin*, after one of the native fruits). The fifth largest island in the world, only Australia, Greenland, Baffin Land, and New Guinea or Papua exceeding it in area (Map: East Indies, D 4). It is situated in the East Indian Archipelago and extends from just north of latitude 7° N. to 4° 10′ S., and from longitude 108° 53′ to 119° 22′ E. It is bounded on the north by the China and Sulu seas, the latter separating it from the Philippine Islands; on the east by the Celebes Sea and Straits of Macassar, which separate it from Celebes; on the south by the Java Sea, which separates it from the island of Java; and on the west by the southern part of the South China Sea, which separates it from Malacca and Sumatra, and by Karimata or Billiton Strait. It is 850 miles long and 600 miles wide in the broadest part, and has an area of about 290,000 square miles, with a population conjectured to be nearly 2,000,000. The interior has been but partially explored, much of the country being one vast, almost impenetrable jungle.

A little north of the middle of the island there is a central highland region called the Madei Mountains, from which stretch out in different directions mountain ranges that in most cases continue to the coast, and which include between them low valleys. A mountain range which, with a certain discontinuity, extends toward the northeast, divides the northern part of the island into eastern and western sections and culminates near the extreme north in the isolated peak Kini Balu, which attains an altitude of 13,700 feet. Other ranges diverge, one toward the west (the Klinkang Mountains); another range toward the southwest, which, with that toward the northeast, forms a central chain; another range toward the southeast, which in approaching the coast bends toward the south and continues to the extreme southeastern corner of Borneo; and still another range toward the east. These mountain ranges do not appear to have had names assigned to them as complete chains, although the different portions have distinctive local names. A number of the summits rise to 7000-9000 feet. In the extreme west are a few small volcanic cones. Between the two main ranges, which diverge to the west and southwest, lies the valley of the Kapuas, which river flows southwest to the west coast, forming there a broad delta after the manner of several of the Borneo rivers. The region on the north of the Klinkang and Madei mountains is drained chiefly toward the west by the Batang Lupar, Rejang, Barram Limbang, and other rivers. The northeast section is drained toward the east by the Koti, Segah, Kajan, and other rivers. The whole southern lowland region is drained toward the south by the Barito (which is nearly 600 miles in length), Little and Great Dyak, Katingan, Pembuan, Kotaringin, Djellei, and other rivers. Many of the rivers are navigable, but only for small boats, as most of the river-mouths are closed by bars which prevent the entrance of sea-going vessels. The rivers are subject to frequent floods at all seasons, and to wide expansion during the rainy season. The southern and eastern sections possess extended areas of lowland, which become flooded during the rainy season and form great lakes, and in the dry season are intersected by numerous watercourses of both river and canal or ditch-like character.

The coast of Borneo is, in the main, indented only by open bays. It has few islands, the chief of which are Labuan on the northwest coast, Banguey on the north coast, Nanokong on the northeast coast, Laut on the southeast coast, and Maivang on the southwest coast.

The geological formations are Tertiary and post-Tertiary, except in the central and western mountains, which are pre-Tertiary, and consist largely of Devonian and Carboniferous schists and slates. Economically, the most important formations are the coal deposits of the Tertiary period, and they show the remains and much of the detailed structure of the luxuriant vegetation of this period. The chief products of the

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rich mineral deposits are gold, diamonds, silver, platinum, mercury, tin, and antimony, to which must be added petroleum, sulphur, rock salt, marble, rock crystal, and porcelain-clay. Most of the streams appear to be auriferous.

During the year the lowland average temperatures range from 77° F. to 80° F., and the midsummer maximum seldom exceeds 95° F. The climate is, however, trying, on account of the great humidity of the air. The rainfall in Borneo is enormous. On the west coast over 160 inches of rain falls in a year, and even in the drier districts 80 inches is received. There is, however, no actually dry period, such as occurs farther from the equator, except for accidental droughts. Thunder-storms are frequent and severe. The lowland climate is unhealthful for Europeans. The winds partake of both trade and monsoon characteristics.

The rich fauna of Borneo belongs to the Malayan sub-region of the Oriental region of Wallace, and indicates past connection with the Continent. Of the mammalia, the most typical are the apes and monkeys (the orang-outang and proboscis monkey), the elephant, rhinoceros, and tapir in limited areas, the honey-bear, wild cattle, wild pigs, deer (especially the 'mouse-deer'), flying lemurs, the feather-tailed tree-shrew, and several members of the cat family. Birds are numerous. The avifauna includes among other birds various hornbills, the argus pheasant, and the edible-nest swallow. Snakes are common, and in the waters of the lower regions dangerous crocodiles abound. The coast and inland waters abound in fish, some of which are dried and form an article of export. Butterflies are very numerous and exceedingly beautiful; beetles, while abundant and of many species, are not so prominent. Insect pests are very annoying; mosquitoes and sand-flies in the air, fire-ants on the ground, and leeches in the waters.

The vegetation of Borneo is rich in species and luxuriant in growth. In the flooded regions the vegetation consists of tangled and matted reed and bush growth, which presents a marked contrast to the forests of the adjacent dry lands. Upward of fifty kinds of trees furnish timber; among them are the mohor, tappau, ironwood, ebony, sandalwood, and teakwood. Various trees furnish saps, gums, and resins, such as gutta-percha, camphor, and dragon's-blood. Numerous palms flourish; among others the useful fan, cocoanut, and sago palm. Spices, nuts, and numerous tropical fruits are produced in profusion. Sugar-cane, cotton, and tobacco are cultivated extensively. In the mountain region rhododendrons grow in profusion, and ferns, orchids, and clinging plants are common, the huge pitcher-plants deserving special mention.

Politically, Borneo is divided into British Borneo and Dutch Borneo, the two being separated by the mountain barrier which extends from the central west coast in a northeasterly direction nearly across the island. British Borneo consists of Saba, or British North Borneo, Brunei, and Sarawak. British North Borneo occupies the northern part of the island, and extends from the eastern shore of Brunei Bay, on the northwestern coast, to the shore of Saint Lucia Bay, on the northeastern coast. It has an area of 31,106 square miles, a coast-line of nearly 1000 miles, and a mixed population of perhaps 175,000, only a few hundred of whom are Europeans. The chief town and seaport is Sandakan, situated on a fine harbor of the same name, on the northeastern coast. Kudat, Gaya, Papar, and Silam are important stations. While this territory is held by the British North Borneo Company, which receives grants from the native sultans, yet since May 12, 1888, the British Government has exercised a formal protectorate over it.

The exports (1899) amounted to $3,500,000, and the imports to $2,500,000. The revenue reaches nearly $500,000. The chief products are timber, tobacco, rice, sago, coffee, spices, gums, sea and jungle produce. The Government issues its own paper notes and copper coinage, accounts being kept in dollars and cents. A marine cable connects Labuan (which was placed under the protectorate of the British North Borneo Company in 1889), on the northwestern coast, with Singapore; and a telegraph-line to Sandakan places the capital in telegraphic communication with the civilized world. A railroad is being constructed from Brunei Bay to Jesselton.

Brunei (Borneo) lies southwest of British North Borneo, occupies the coast as far west as Baram River, covers an area of 15,000 square miles, and has a mixed population of about 45,000. Its chief town is Brunei, on a bay of the same name. It is governed by a sultan of Brunei, but is under British protection. Brunei has been called the 'Venice of the East.' Its trade is of little importance, the chief article of export being sago.

Sarawak lies southwest of Brunei, and extends along the northwestern coast of Borneo for a distance of 400 miles, from Cape Baram to Cape Datu. Its southern limit is the watershed of the Krumbang and Klinkang mountains. It covers an area of about 50,000 square miles, and has a mixed population of about 600,000. The chief town is Kuching or Sarawak, with a population of 20,000, about 25 miles from the coast, on the Sarawak River. Sibu, on the Rejang River, which is navigated for some distance by large steamers, is another important town. The territory is governed by a rajah, but is under British protection. Commercially, Sarawak is of considerable importance, the import trade (1899) amounting to $3,250,000, and the export trade to $4,500,000. The Government budget amounts to about $850,000, the revenue being derived from both import and export duties and various personal taxes. The chief products are tobacco, sago, rice, gums, coffee, spices, jungle produce, and dried fish. Coal is abundant, and the precious metals, diamonds, and mercury are found. Both the Church of England and the Roman Catholic Church have established missions and built churches. A boys' and girls' school has been established at Kuching.

Dutch Borneo, which occupies the southern and most of the eastern part of the island, has a coast-line extending from Saint Lucia Bay (latitude 4° 10′ N.) in northeast Borneo to Cape Datu on the west coast. It has an area of about 213,000 square miles and a population estimated to be 1,180,000. The country is divided into two residencies—West Borneo and South and East Borneo. The Dutch govern the country, so far as possible, through the native rulers. West Borneo embraces the valley of the Kapuas, and has great mountain ranges on the northern and

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southeastern boundaries; on the coast it extends from Cape Datu on the north to Cape Sambur on the south. It has an area of 55,825 square miles and a population of (approximately) 370,-800. There are two provinces — Pontianak and Montrado. The chief city is Pontianak, on the Kapuas River. Sambas, Sintang, and Sukadana are important towns. The exports amount to over a million and a half dollars a year. The chief of these are copra, gutta-percha, rattan, and cocoanut-oil.

South and East Borneo, which extends from Cape Sambur to Saint Lucia Bay, and occupies the southeastern half of the island, has an area of 156,000 square miles and a population of 809,-800. The chief city and capital is Banjarmasin. Other important towns are Kotaringin in the southwest, Matapura in the south, Pasir in the southeast, Tangarung, Somarinda, and Koti in the east, and Gunung Tebui in the northeast. The regions best known and most densely populated are in the south and west. North of the Pasir River the interior and even the coast is but little known. The exports amount to $750,-000 a year, gutta-percha and rattan being the most important.

Inhabitants.—Although the vast extent of the island, with its numerous cave and other shelters, shell-heaps, etc., has not been completely explored, the human remains and evidences of man's industry so far discovered go to prove that man is a much less ancient resident than in Java and Sumatra. The native population, recent immigrants of other races like the Arabs and Chinese excluded, belong, as their languages show, without exception, to the Malayan family, no traces of a previous Negrito occupation being discernible. The interior and certain portions of the coast are peopled by the Dyaks (nomadic and sedentary, land and sea Dyaks, the farther away from the coast, the less mixed with other Malayan peoples, Chinese, etc.), the characteristic aborigines of the island. A great part of the coast region is controlled by Malays, the descendants of colonists from the peninsula of Malacca, the islands of Java, Sumatra, and other islands of the great East Indian Archipelago, Bugis from Celebes, and, in the extreme north, Suluans from the Sulu Archipelago in the Philippines. The Malays and the Bugis are the more civilized classes, and are more devoted to trade, commerce, and a sedentary life; and it is from the Malay State of Brunei, north of Sarawak, that the island has received its name. The Malays profess Islam; the Dyaks, those of the interior especially, retain much of their primitive Shamanism and nature-worship. Borneo has been the classic land of the 'head-hunter,' and here are to be found in their purity many other curious Malayan customs. It is also the home of a species of blowgun and the poisoned arrows that belong with it.

Borneo was first discovered by Europeans in the early part of the Sixteenth Century, when both the Portuguese and Spaniards visited it. The Portuguese soon established commercial relations with the natives. In the latter part of the century the Spaniards also entered upon similar relations. Neither of these European peoples, however, had any very marked influence on the country. The Dutch began trading in Borneo in 1604, and five years later the English appeared and gained a foothold in the south, which they held for nearly a century. In the early part of the Eighteenth Century the Dutch forced the English out of this section; but about the middle of the century the latter reappeared in the northern part. Then, after a lapse of about twenty-five years, the English influence waned for half a century, to be renewed in the early part of the Nineteenth Century, chiefly through the activity of Sir James Brooke. Meanwhile the Dutch slowly but surely strengthened their position in the southern and eastern parts of the island, by affiliating their governing officers with the native chiefs, through whom they controlled the people.

Consult: Veth, *Borneo's Westerafdeeling* (Zalt-Bommel, 1846); Bemmelen and Hooyer, *Guide to the Dutch East Indies* (London, 1897); Lith, *Encyclopedie van Nederl-Indië* (Leyden, 1895); Wallace, *The Malay Archipelago* (London, 1869); Posewitz, *Borneo: Its Geology and Mineral Resources* (London, 1892); Roth, *The Natives of Sarawak and British North Borneo* (London, 1896); O. W. S., *European Settlements in the Far East* (New York, 1900); Breitenstein, *Einundzwanzig Jahre in Indien* (Leipzig, 1899); Bock, *Head-Hunters of Borneo* (London, 1881).

BORNEO CAMPHOR. See BORNEOL.

BOR'NEOL, or BORNEO CAMPHOR ($C_{10}H_{18}O$). A substance often used as a substitute for common or Japan camphor. It is a crystalline organic compound, similar to common camphor, but having an aromatic, pepper-like odor. It sinks in water, and is thus readily distinguished from common camphor. Borneol is obtained chiefly from the *Dryobalonops camphora*, growing in Borneo and Sumatra. It is one of the constituents of oil of rosemary, and occurs in the rhizome and roots of the *Valeriana officinalis*. It can be produced by reducing common camphor with nascent hydrogen. The hydrocarbon *Borneëne* ($C_{10}H_{18}$) is obtained by distilling borneol with anhydrous phosphoric acid.

BORNET, bôr'nâ', JEAN BAPTISTE EDOUARD (1828—). A French botanist, born at Guérigny (Nièvre). He studied medicine in Paris, and botany, especially fungi, under the direction of Tulasne (q.v.) and Leveillé. Afterwards he accompanied Thuret to Cherbourg, where he devoted his attention chiefly to the study of marine algæ, with which several of his books deal. His works, in some of which he collaborated with Thuret, include: *Recherches sur la structure de l'éphèbe pubescens* (1852); *Recherches sur la fécondation des Floridées* (1867); *Recherches sur les gonidies des Lichens* (1873); *Notes algologiques, recueil d'observations sur les Algues* (1876-80); *Revisions des Nostocacées hétérocystées*, in collaboration with Flahault (1886).

BORNHOLM, bôrn'hôlm (anciently, *Borgundarholmr*, Burgundians' Island, from Old Norse *hólmr*, Ger. *Holm*, Engl. *holm*, an islet). An island in the Baltic Sea, belonging to Denmark, and situated about 90 miles east from Zealand, and one-third of the distance from the Swedish to the German coast, in latitude 55° N., longitude 15° E. Area, about 220 square miles (Map: Denmark, G 2). The surface is partly mountainous and rocky and partly low. The chief formation is granite, of which large quantities are taken for building purposes. There are also some coal deposits, and a fine grade of porcelain-

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clay is also obtained for industrial uses. The inhabitants carry on successfully agriculture and cattle-raising and the manufacture of porcelain-ware. With the exception of the capital, Rönne (population over 8000), there are no settlements, but separate farms are scattered over the island. Population, in 1901, 40,877. Independent prior to 1000, the island became a Danish possession, subsequently belonging to Lübeck in the Sixteenth Century and to Sweden in the Seventeenth Century, but was returned to Denmark in 1660.

BORNIER, bôr'nyā', HENRI, Vicomte de (1825-1901). A French poet and dramatic author. He was born in Lunel (Hérault), December 27, 1825, and after pursuing his studies in Montpellier and elsewhere, went to Paris to become a law student. About the same time he published his *Premières feuilles* of verse (1845), and had a play, *Le mariage de Luther*, accepted conditionally at the Théâtre Français. He received a post at the Bibliothèque de l'Arsenal, where he rose successively, till in 1889 he became its administrator. Meantime he continued writing, among his dramas being: *Le Monde renversé* (1853); *Dante et Béatrix* (1853); *Agamemnon*, a tragedy in imitation of Seneca, produced at the Théâtre Français in 1868; *La fille de Roland*, which had a great success in 1875; *L'Apôtre* (1881); *Mahomet*, which, though received at the Théâtre Français, was in 1890 forbidden representation, at the request of the Turkish Ambassador; and *Le fils de l'Arétin* (1895). Besides his dramatic works, he was the author of numerous other publications in verse and prose. His poems on *L'Isthme de Suez* (1861) and *La France dans l'extrême Orient* (1863), and his *Eloge de Châteaubriand* (1864), were crowned by the Academy. His verses on *La muse de Corneille* (1884), written for the Odéon, are also well known. He wrote several novels, among them *La lizardière* (1883) and *Le jeu des vertus, roman d'un auteur dramatique* (1885). In 1893 he was elected a member of the Academy, and his *Poésies complètes* were republished the next year. His death occurred in Paris, January 27, 1901.

BORNU, bôr-nōō' (from the tribe *Berauni*, *Bernāuni*). A State of the Sudan, occupying the northeastern end of Northern Nigeria, between latitudes 11° and 15° N. and longitudes 10° and 15° E., and bounded by Sokoto, the Sahara, Lake Chad, and Kamerun (Map: Africa, F 3). Its area is estimated at 50,000 square miles. The surface is mostly level, with the exception of the southwestern part, where some of the mountains rise to an elevation of about 2000 feet. The climate is excessively hot and unhealthful, the temperature not infrequently rising above 100° during the summer. The rainy season lasts from five to seven months, and produces malaria and other diseases. The two principal rivers are the Shari and the Waube, both of which fall into Lake Chad. The soil is fertile, and, although the cultivation is very imperfect, produces plentiful crops of maize, millet, barley, rice, various kinds of pulse, cotton, and indigo. In its flora and fauna Bornu does not differ much from the rest of Northern Nigeria. The industries of Bornu are not numerous, and are chiefly confined to the manufacture of cotton fabrics. In former years slaves were very extensively dealt in, and exported to many countries, slave-hunting constituting at that time one of the principal occupations of the natives. At the head of the State is a Sheik, who has absolute power. He is assisted by a council. Bornu is divided into several provinces, and has also a number of vassal States and dependencies. There is an army of about 5000 men. The capital is Kuka (q.v.), with a population of about 60,000. The population of Bornu is estimated at 5,000,000, and consists of a number of mixed negro races. The bulk of the population are known as the Kanowry, who are characterized by a finer physique and a higher standard of intelligence than the rest of the population. The territory of Bornu was invaded in the Twelfth Century by the Mohammedan ruler of Kanem. After 200 years of warfare the aborigines were either extirpated or completely subjected, and from 1353 a line of kings ruled over the country. Bornu was at the height of its power at the close of the Sixteenth Century, when its western frontier extended to the Niger River. After 1600 it underwent a rapid decline. In the beginning of the Nineteenth Century it was conquered by the Fellatahs, whose yoke, however, was soon shaken off, under the leadership of a fanatical fakir, named Mohammed el Kanemi, whose services were called in by the Sultan. Mohammed founded the town of Kuka, and ruled there under the title of Sheik, while the Sultan enjoyed only nominal power. Mohammed's son, Omar, became Sultan as well as Sheik. In 1882 Omar was succeeded by the Sultan Abu Bekr. Our scant knowledge of the country is due to the travels of Barth, Nachtigal, and subsequent French and German explorers.

BO'RO BUD'DOR (Hind., great Buddha). The ruin of a Buddhist temple in Java, Residency of Kadu, Regency of Magelang, and District of Minoreh, near the junction of the Ello and Progo. It is the most elaborate monument of the Buddhist style of architecture anywhere existing. Buddhism (q.v.) was early introduced into Java, and the building of Boro Buddor is assigned to the Seventh Century. It is a pyramid of a square form, each side at the base measuring 600 feet, and consists of seven walls, which are built like the steps of a stair up a hill. Between the walls are narrow terraces running round the building. The walls are richly ornamented with statuary. Outside are niches, each of which is occupied by a statue of Buddha, larger than life, seated in the usual attitude, with the legs crossed under the body. The number of these figures is about 400. Between each two of these are bas-reliefs representing the god in the same attitude, besides architectural ornaments and carvings of all sorts. Below the niches, on the lower story, is an immense bas-relief encircling the whole building, representing scenes from the life of Buddha, and religious subjects. The inner faces of the building are also profusely ornamented with bas-reliefs, seated figures, and architectural ornaments. The whole is a splendid artistic epitome of Buddhism just before its decline. The five lower concentric terraces are on a square plan, and may represent a Buddhist *vihara* (q.v.) or monastery. The three uppermost terraces are circular, and represent the *tope* (q.v.). They are surmounted each by a tier of small domes,

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72 in all, each containing a statue of Buddha; while in the centre, rising high above everything else, is the large dome or pagoda (q.v.) for the relic of Buddha.

BORODIN, bô-rō'dēn, ALEXANDER PORFIRYEVICH (1834-87). A Russian composer and chemist. He was born in Saint Petersburg, of a very ancient family. He studied medicine and chemistry at the Medico-Surgical Academy, practiced medicine for a while, and, being appointed to the chair of chemistry at his *Alma Mater*, went abroad to prepare for his duties. It is claimed that, during his studies in Paris, Heidelberg, and Italy, he had anticipated Wurtz in the discovery of aldol. In all, he wrote 21 articles and monographs of importance. During the Liberal movement of the sixties (see RUSSIAN LITERATURE), he espoused the cause of university education for women in Russia, and from 1872 till his death gave gratuitous instruction in chemistry at the Medical School for Women, opened by Professor Rudnyeff and Mme. Farnooskaya. Amid his arduous professional duties he found time for composition as a recreation only. His musical studies had begun quite early. At nine he played on his piano the music performed by regiment bands, and at thirteen wrote a concerto for the flute. With a friend he played over all the symphonies of Beethoven, Mozart, and Haydn in arrangements for four hands. Besides, for chamber music, Borodin learned to play the 'cello, and his friend the violin. Later he joined the circle of Balakireff (q.v.), and took up music seriously. While abroad he met Liszt, who later classed him as one of the greatest musicians of the age, and made his works known in Western Europe. He wrote his first symphony in 1862-67, and then in 1869 began the opera *Prince Igor*, on a libretto based on the epic *Prince Igor's Band* (q.v.), but soon left the work and utilized the composed parts for his second symphony (1860-76), the so-called 'heroic.' He then resumed work on the opera, which, however, was still unfinished at his death. It was orchestrated and finished by Rimsky-Korsakoff (q.v.) and Glazounoff (q.v.), and scored an enormous success at its first performance in November, 1890. He also wrote two string quartets besides a score of songs of wonderful lyric depth. His *In Central Asia* (1880), a 'musical picture' is one of the mainstays of the concert-room. Two movements of his third symphony were reconstructed by Glazounoff, partly from rough draughts and partly from memory. Though a member of the Balakireff circle, Borodin could not give up the rounded forms of the classical opera. His talent was essentially melodic, and his cantilenas are stamped with the breadth and power of a giant. The epic might and the Oriental coloring of his orchestration in *In Central Asia* hold a place among the most notable musical achievements in the Nineteenth Century. Consult Habets, *Life and Works of a Russian Composer*, English trans. by Rosa Newmarch (London, 1897).

BORODINO, bô-rō'dē-nō'. A village of Russia, in the Government of Moscow, about 70 miles west of the city of that name. It is situated on the Kaluga, an affluent of the Moskva, and gave its name to the great battle fought between the French Army under Napoleon and the Russians under Kutusoff, Barclay de Tolly, and Bagration, September 7, 1812. The battle of Borodino was one of the most obstinate in history, and the loss on both sides was almost equally great. The struggle consisted chiefly in the attempt of the French to capture three lines of redoubts barring the way to the city of Moscow. These were thrice won and lost during the day. Out of 257,000 men engaged, between 70,000 and 80,000 were killed and wounded. The Russians retreated on the following day, but in the most perfect order, and without the enemy's venturing to attack them. The Russians, therefore, have always regarded this battle as a victory, and in 1839 raised a fine mausoleum on the battlefield. To the French, however, certainly belongs the honor, as they not only remained on the field of battle, but soon after pushed on to Moscow. The French call it the battle of the Moskva, from the river of that name, and it gave Marshal Ney his title of Prince of Moskva. A magnificent description of the weird splendor and the horrors of the battle may be found in Count Leo Tolstoi's novel, *War and Peace*.

BO'RON (from *borax*, of which it is a component). A non-metallic element, which was isolated in 1808 by Gay-Lussac and Thénard in France, and by Sir Humphry Davy in England. Some of the compounds of boron were known to the ancients. The element is not found native, but occurs in combination in the following minerals: *Sassolite*, a boric acid; *borax*, a sodium borate; *boracite*, a magnesium borate with magnesium chloride; and *ulexite*, a sodium and calcium hydrous borate. Boron was originally obtained by heating boric oxide with metallic potassium, then boiling the fused mass with hydrochloric acid to remove the soluble salts; while the residue, consisting of amorphous boron, was washed with water and dried. It can also be obtained by the electrolysis of fused boric oxide. As thus prepared, boron (symbol B, atomic weight, 11.0) is an odorless, grayish-brown amorphous powder. It is a non-conductor of electricity and fuses only at a very high heat. It may be melted by placing it between the poles of a battery of 600 Bunsen cells. The specific gravity of amorphous boron is upward of 1.84. A crystalline variety of boron was prepared by Wöhler and Deville in 1856. It may be obtained by heating the amorphous variety for two hours with metallic aluminum to a temperature of from 1500° to 1600° C. Small monoclinic crystals are produced by this process, which, however, contain a small amount of aluminum. These crystals have been called *boron diamonds*, owing to their lustre and hardness, as they scratch both ruby and corundum. They have a specific gravity of 2.68. Boron is the only non-metallic element that forms no compound with hydrogen. Its principal commercial compounds are boric acid, boric oxide, and certain borates, especially borax.

BORO'RO. A native American tribe inhabiting the Upper Paraguay and Upper Parona basins. They are tall (m.1.74) and athletic, and live by the chase, using bows of great length with arrows of cane tipped with bone or tooth. They are reputed to be both polygynous and polyandrous. They number several thousand.

BOROUGH, bŭr'ō (AS. *burh, burg*, Ger. *Burg*, a fort, from AS. *beorgan*, to protect). In Great

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Britain, an incorporated municipality, either village, town, or city, having the right of returning one or more members to Parliament. The word *burh* appears in many forms in the names of towns, as in Canterbury, Edinburgh, Peterborough, Hamburg, and has kindred forms in several of the Continental languages, such as the French *bourgeois*. It originally signified a hill or mound; as places of defense were thrown up on elevated positions it came to mean a castle or fort, and afterwards the collection of houses and other buildings which gathered naturally beneath the fortified hill. Boroughs existed in England from the earliest times. According to the Domesday Book, there were eighty-two boroughs. Each of these had a market or an annual fair, was ruled by an elective officer, usually called the port-reeve, and had the privilege of a special borough-court, which was independent of the larger divisions, known as hundreds and shires. The Normans utilized these units of government, supplanted the port-reeves with officers deriving their authority directly from the throne, and in time the boroughs received the privileges belonging to municipal corporations. By the time of Henry VI. the boroughs had generally become municipalities, with the power of government vested in the members of the principal guilds. During the same period the boroughs obtained the right of sending burgesses to Parliament. In course of time many of these boroughs decreased in population and became little more than names, but without losing their Parliamentary representation; others came entirely under the control of members of the nobility, and acted in elections only under such restraint. These two classes of boroughs received the names respectively of 'rotton boroughs' and 'pocket-boroughs.' Many of these were swept out of existence as regarded their Parliamentary rights by the Reform agitation, which culminated in the Reform Bill (q.v.) of 1832. The borough system of Scotland is even of greater antiquity than that of England. A confederation of boroughs for purposes of mutual defense and of the protection of trades existed in the reign of David I., and was called a Hanse.

In Connecticut, New Jersey, Minnesota, and Pennsylvania, the term borough is applied to incorporated towns or villages of a lower grade than a city. William Penn's charter to the territory west of the Delaware River authorized him in 1681 to erect the country, among other divisions, into boroughs similar to those of England. This system of boroughs continues in Pennsylvania to the present time. In 1619 Virginia had eleven boroughs, the delegates of which sat in the House of Burgesses; but boroughs, as in incorporated towns, never obtained a footing in that State. The charter granted to Lord Baltimore entitled him to create boroughs in Maryland, but they were never so created. In New Jersey boroughs date back to the early part of the Eighteenth Century, but they were erected by special acts and without uniformity of system until 1818, when a General Borough Act was passed.

Greater New York, by an act passed by the Legislature of 1897, was made a city, composed of five boroughs—Manhattan, the Bronx, Brooklyn, Queens, and Richmond.

BOROUGH, THE. See CRABBE, GEORGE.

BOROUGH ENGLISH (from Anglo-French *tenure en burgh engloys*, tenure in an English borough). A curious custom that prevails in some parts of England, according to which the youngest son inherits the property in preference to his elder brothers. The reason assigned for the custom by Littleton is that the youngest son, on account of his tender age, is not so capable as his elder brothers to maintain himself. Blackstone, however, suggests, what is doubtless nearer the truth, that the custom is a survival out of the conditions of primitive society—a view which is strengthened by the sporadic occurrence of the custom in widely separated parts of the Continent of Europe. A posthumous son is entitled to this privilege, and dispossesses his elder brother. The right of representation also exists with reference to it; for should the youngest son die in his father's lifetime, leaving a daughter, she will inherit the property. See GAVELKIND; INHERITANCE; PRIMOGENITURE. Consult: Blackstone, *Commentaries on the Laws of England;* Elton, *Origins of English History* (London, 1882); Pollock and Maitland, *History of English Law* (2d ed., Boston, 1899).

BOROUGH JUSTICES. Local justices first appointed in the time of Charles I. Under the Municipal Corporations Act (1882, 45 and 46 Vict. c. 50), these justices consist of the mayor during his year of office, and for one year after it determines, the recorder *ex officio*, and such persons as the Crown may appoint by commission. Their duties cannot be delegated; and before acting, they must take the oath of allegiance and the judicial oath. See BOROUGH; JUSTICES.

BOROUGH LAWS. In Scottish legal history, a code of ancient laws which have long ceased to have any force, but serve to throw light on the ancient manners and customs of the country. The authenticity of the compilation is beyond question. It is supposed to have been made in the reign of David I., in the Twelfth Century. See BRETTS AND SCOTS; and consult Erskine, *Principles of the Law of Scotland* (18th ed., Edinburgh, 1890).

BOROVITCHI, bō'ro-vê-chē'. A town in the Russian Government of Novgorod, situated on both sides of the Msta, near the famous rapids of Borovitchi (Map: Russia, D 3). The inhabitants are engaged in ship-building, the dyeing of cloth and cotton goods, and the production of earthenware. The natives are famous for their skill as pilots (for which the proximity of the rapids is mainly responsible); and Peter the Great considered them of such importance to the commerce of the country that he freed the town of all State taxes, in order to induce its inhabitants to continue their dangerous occupation. Borovitchi has a salubrious climate, and, owing to its comparative proximity to Saint Petersburg (200 miles), is a favorite summer resort of the residents of the capital. Population, in 1897, 9421.

BOR'ROME'AN ISLANDS (so named after the Borromeo family). Four small rocky islands in Lago Maggiore (q.v.), in northern Italy (Map: Italy, C 2). These islands are famed for their beauty, due partly to their surroundings and partly to the degree of their artificial development from mere rocks to luxuriant gardens. The one best known to tourists is Isola Bella, on which Count Vitaliano Borromeo, in the latter part of

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the Seventeenth Century, built a castle, which contains some good paintings and other art treasures, but the north wing of which is still unfinished. The garden, which rises in ten terraces on the southern slope, contains rare plants and numerous shell-grottoes, and is adorned with fountains and statues. On Isola Madre the terraced garden is less extensive. The population of the islands is about 300.

BORROMEO, bŏr'rō-mā'ō, CARLO (1538-84), Count. A saint of the Church of Rome. He was born October 2, 1538, at the castle of Arona, on the west bank of Lago Maggiore, the family seat of his ancestors. He studied law at Pavia, and took the degree of doctor in 1559. His uncle, Pope Pius IV. (1559-65), soon after being raised to the Pontificate, appointed him, notwithstanding his youth, to a number of high offices, and made him a Cardinal and Archbishop of Milan. Borromeo displayed great faithfulness and ability in governing Ancona, Bologna, and other parts of the States of the Church as Legate, and in discharging the duties of offices connected with ecclesiastical administration in Rome. Surrounded, as he was, with magnificence and luxury, he was always grave, pious, and rigid in his life, studious, and a patron of letters.

Pius IV. made him his grand plentipotentiary, and did nothing important without his coöperation. It was in a great measure through his influence that the reopening of the Council of Trent was accomplished, and that its deliberations were brought to a conclusion so favorable to the Papal throne. He committed its decrees to memory, had the principal part in drawing up the *Catechismus Romanus* for exposition of them, and proceeded to give all possible effect to them in his archiepiscopal province. Borromeo's exertions, not only for the improvement of ecclesiastical discipline, but also for the reformation of morals in the Archbishopric of Milan, drew upon him the hostility of the monastic orders, and also, to some extent, that of the Spanish authorities in Milan, who were jealous of the extension of his jurisdiction. An attempt was even made upon his life in 1569. He spent a great part of his income in beautifying the cathedral and other churches. With a view to providing well-qualified priests, he founded in 1570 the Helvetic College in Milan. He brought about an alliance of the seven Catholic cantons, known as the Golden Borromean League, for the united defense of their faith. He exerted his energies successfully in extirpating Protestantism from Milan by means of the Inquisition. In the famine of 1570, and during the plague in Milan in 1578, he displayed great energy and benevolence, saving the lives of multitudes by the prompt arrangements which he made for necessary relief. Exhausted by his labors and his austerities, he died on November 3, 1584. He was canonized in 1610. His embalmed body, enshrined in a silver sarcophagus and visible through a lid of rock-crystal, lies in Milan Cathedral in the Cappella San Carlo Borromeo beneath the dome—a subterranean crypt, noted for its wealth of decoration and accumulation of priceless jewels and costly gifts. The saint's body and other relics may be viewed by permission. Many miracles are said to have been wrought at his tomb.

His theological works were published at Milan, in 1747, in five volumes folio. On the western bank of Lago Maggiore, in the neighborhood of his birthplace, a colossal brazen statue of him, 70 feet high, was erected in 1697. His brother's son, Count Federigo Borromeo, born 1564, was also a cardinal, and from 1595 to 1631 Archbishop of Milan, and was the founder of the Ambrosian Library (q.v.). He died in 1631. For the best biography of Borromeo, consult Sylvain, 3 vols. (Bruges, 1884).

BORROMINI, bŏr'rō-mē'nē, FRANCESCO (1599-1667). An Italian sculptor and architect, born at Bissone (Lombardy). He studied sculpture in Milan, and architecture in Rome under Carlo Maderno, then architect of Saint Peter's, whom he assisted in some of his work. After Maderno's death he continued for some time under the direction of Bernini, the succeeding architect. But an unreasoning hatred for Bernini sadly disfigured both his character and his art. Bent upon surpassing his rival, he attempted the arbitrary and the bizarre, and became one of the chief representatives of the baroque style. He built the Church of San Ivo alla Sapienza, the Oratory and Cloister of San Filippo Neri, the façade of the Church of Santa Agnese in the Piazza Navona, and the interior of San Giovanni in Laterano. Mortified at Bernini's success, he killed himself in an access of hypochondria.

BOR'ROW, GEORGE HENRY (1803-81). An English author. He was born at East Dereham, Norfolk, July 5, 1803, the son of Capt. Thomas Borrow, of the West Norfolk Regiment. Moving with his father's regiment from one station to another, he saw much of England. He was also for a short time in Edinburgh, where he attended the high school, and then in Ireland. In 1816 the family settled at Norwich, and three years later George was articled to the law. He had already acquired some knowledge of seven languages; and now, instead of attending to the law, he proceeded to study seven more. He had also become interested in the gypsies, and had read many tales of wild adventure. On the death of his father (1824) he went to London, where he was employed as compiler and hack; his longest production was *Celebrated Trials* (1825), giving the record of all sorts of criminals. To this period also belongs *Romantic Ballads* (1826), translations from the Danish. In 1838 Borrow was appointed agent for the British and Foreign Bible Society. Now began, in the service of this society, his extensive tours through Russia, and afterwards through Portugal and Spain. Later he traveled as far east as Constantinople. True to his youthful predilection, he made the gypsies scattered over every part of Europe one of the principal subjects of his study. And he was continually adding to his vast linguistic knowledge. In 1840 he married and settled on Culton Broad, near Lowestoft. From here he made many excursions through Celtic Britain—Cornwall, Wales, Ireland, etc.,—and for a time lived at Yarmouth. In 1860 he removed to London, and in 1874 returned to Culton, where he died, July 26, 1881. Borrow was a man of splendid physique. His knowledge of languages was probably more extensive than profound. But in literature he has left a name. His first important work—*The Zincali*, an account of the gypsies in Spain—appeared in 1841. It was followed two years later by *The Bible in Spain*, the most widely read of all Borrow's works. In 1851 was published *Lavengro*, and in 1857 its sequel, *The Romany Rye*. These

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three fascinating books are largely autobiographical. Of almost equal interest is *Wild Wales* (1862). For an authoritative life of Borrow, consult Knapp, 2 vols. (London, 1899). Knapp has also carefully edited *Lavengro*, *The Romany Rye*, and other works (London, 1900).

BORROWING (AS. *borgian*, Ger. *borgen*, to borrow; literally, to give a pledge, AS. *borg*, *borh*, Ger. *Borg*, pledge, security). The taking or receiving something from another on trust, with the intention of returning it or giving an equivalent for it. As sometimes used, the word borrowing implies that the borrower is under the obligation of returning the specific thing borrowed, as to borrow a book or any other thing to be returned again. In this case, it is that form of the contract of bailment (q.v.) legally termed *commodatum*, if no pay is to be given; but when payment is to be made, the borrowing is a *locatio*, so called. Where the agreement is to return another article of the same kind and value, the contract is rather in the nature of a barter or sale. Where money is borrowed, the identical money is not expected to be returned, so that to borrow in this sense is to make a contract for the use of money. While theoretically borrowing may be of real estate, or an incorporeal right, in practice the use of the term is confined to personal property.

Unless the agreement of lending specifies the time when the borrowed article shall be returned, it is returnable at the demand of the lender. Where the lending is gratuitous and without consideration, it imposes no obligation on the lender, and he may terminate the arrangement at his will. See BAILMENT.

BORROWING DAYS. The last three days of March in the old-style calendar, or April 11-14 in the present new style. These days were from most ancient times in Scotland called 'borrowing days,' because they are usually cold and snowy, so that it is said:

> "March borrows frae April
> Three days, an' they are ill;
> The first o' them is wun' an' weet;
> The second it is snaw an' sleet;
> The third o' them is a peel-a-bane,
> And freezes the wee bird's neb tae stane."

The meteorologist, Buchan, says that he has examined the records of temperature for a number of years, and has shown that there is a distinct cold period between the 11th and 14th of April, corresponding to this old popular saying, the origin of which is lost in the mist of antiquity. Consult Buchan, *Handy Book of Meteorology* (Edinburgh, 1868).

BOR'ROWSTOUNNESS' ('the cape near Burward's dwelling,' from AS. *Nasu*, in composition *naes*, headland, nose, Lat. *nasus*, Ger. *Nase*, nose); usually shortened to *Bo'ness*, bô-nĕs'. A seaport in Linlithgowshire, Scotland, in the Firth of Forth, 15 miles west-northwest of Edinburgh (Map: Scotland, E 3). It has coal-mines extending under the bed of the Forth, and manufactures of salt, soap, malt, vitriol, and earthenware. It has an export trade in coal, iron, and steel manufactures, and manures, and imports maize, timber, iron ore, paper-making materials, etc. Ironstone, limestone, and freestone exist in the parish. Graham's Dike, a port of the Roman Wall of Antoninus, traverses the parish. Dugald Stewart (q.v.) lived near Borrowstounness. Population of police burgh, in 1901, 9100.

BORS. The name of the King of Gaul in the Arthurian story. He was brother of King Ban of Benwicke, and both were Arthur's faithful allies.

BORS, or **BO'HORT,** SIR. One of King Arthur's knights, and nephew of Lancelot. When Guinevere was accused by Sir Nador, Bors was appointed to fight for her; but on the day of the contest his place was taken by Sir Lancelot.

BORSIPPA, bôr-sĭp'pâ (probably from *bulsif*, mixture of languages; cf. *Babel*, which, according to the Bible, means the same). A town situated on the west bank of the Euphrates, opposite the city of Babylon, and forming, in the days of the Neo-Babylonian monarchy, a suburb of Babylon itself. There are indications that the place was fully as old as Babylon, and it would appear, indeed, that its religious significance even antedates that of Babylon itself. The chief deity worshiped at Borsippa was Nabu (or Nebo), to whom Tashmitum is given as a consort. Nabu, originally, as would appear, a water-deity, becomes the patron of letters and learning in Babylon. He is the god of writing and wisdom in general. His temple at Borsippa, known as E-zida the 'true' (i.e. fixed and legitimate house), becomes in the course of time, with E-sagila, the 'lofty house,' the temple of Marduk, the most significant sacred structure of the south, to which a solemn pilgrimage was made on the Babylonian New Year's festival. The site of Borsippa is represented by Birs-Nimrud, and the remains of the temple-tower at that place are associated in both popular and learned tradition with the legendary Tower of Babel (q.v.). See BABYLON.

BORSTELL, bôr'stĕl, KARL HEINRICH LUDWIG VON (1773-1844). A Prussian soldier, born at Tangermünde. He served as commander-in-chief in Pomerania in 1812, and in this capacity did much to check the excesses of the French. As major-general he took a prominent part in the campaigns of 1813, and his bold though unauthorized move at Dennewitz decided that conflict. At the battle of Leipzig (October 16-19, 1813) his brigade was the first to enter the gates of the city. Soon afterwards appointed lieutenant-general, he accompanied Bülow's corps to Holland (1814), and after the departure of that general remained behind with 10,000 men to complete the conquest of the country. While engaged in the organization of the Second Prussian Army Corps, which had been intrusted to him (1815), a revolt, engendered by political discontent, broke out among several Saxon battalions stationed at Liège; and although promptly suppressed, Blücher ordered seven of the leaders to be shot and the flags of the insubordinate battalions to be burned. By reason of his failure to comply with this request, Borstell was sentenced to four years' military confinement. Several months later, however, he was pardoned by the King, who appointed him commander of Magdeburg.

BORT. See DIAMOND.

BORTNYANSKI, bôrt-nyän'skê, DMITRI STEPANOVITCH (1751-1825). A Russian composer of church music. He was born in Glukhov, Government of Chernigov, and at seven joined the Court Choir at the capital, where he studied under Galuppi. Catharine II., struck by his

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musical gifts, sent him to Italy. Under Galuppi, who had left Russia, and other famous masters, he studied for eleven years in Venice, Rome, Bologna, and Naples. He won success with his operas *Creonte* (Venice, 1776) and *Quinto Fabio* (Modena, 1778), but did not mistake his true vocation, and clung to the study of the great Italian church composers. His own compositions of this period are distinguished by the lofty nobility and serenity of his models, with hardly a trace of the floritures and pyrotechnics then in vogue in Italian music, and abundant in his operas. On returning to Russia (1779) he was appointed composer to the Court Choir. Paul I. transformed it in 1796 into the *Imperial Capella*, of which Bortnyanski was director till his very death. Finding the choir in a poor state, Bortnyanski sought out the best voices in Russia, and in a few years the capella became the most famous in the world. In the service he also found many evils: ignorant choir-masters had altered the antique melodies to make their task easier, or had set the texts to secular melodies, trivial and out of keeping with the church atmosphere. He obtained a decree of the Holy Synod to the effect that all part-music was to conform strictly with printed texts. For this purpose the music was revised and edited by Bortnyanski.

Bortnyanski, often styled 'the Russian Palestrina,' made an epoch in Russian church music. His compositions, especially the "Cherubim Song" (which, according to O. Fouque, is the only one deserving that name), are performed in Christian churches the world over. They combine the austerity of the Greek psalmody with the Italian polyphony. Their simple harmonies embody the deeply devotional spirit of the texts, without studied effects that only distract worshipers. Among his compositions, edited by Tschaikowsky in 10 volumes, are 35 sacred concertos, 8 church trios with choir, a liturgy for three voices, 7 cherubim songs, a collection of psalms, hymns of praise for four voices and two choirs, etc.

Berlioz thus characterizes Bortnyanski: "All his works are imbued with a genuine religious feeling, at times a sort of mysticism which raises the hearer to an exalted state of emotion. In addition, Bortnyanski has a rare skill in grouping vocal masses, an extraordinary knowledge of nuances, a sonorousness of harmony, and, what is most remarkable, an incredible freedom in the disposition of the vocal parts; a contempt for the rules honored both by his predecessors and his contemporaries, especially the Italian masters, among whose pupils he is usually counted."

BORY DE SAINT VINCENT, bō'rē' de săn' văn'săn', JEAN BAPTISTE GEORGE MARIE (1780-1846). A French naturalist, born at Agen. In 1798 he started with Captain Baudin on a scientific mission to Australia, but was separated from his companion and explored the Ile de France, Réunion, and Saint Helena, alone. On his return he wrote his *Essai sur les Iles fortunées et l'antique Atlantide* (Paris, 1803), and his *Voyage dans les quatre principales îles des mers d'Afrique* (Paris, 1804). He served at Ulm and Austerlitz, on Soult's staff in Spain, and as a colonel at Waterloo. After this he had to retire to Belgium, and at Brussels he edited, along with Van Mons, the *Annales des sciences physiques* (8 vols). He also published an admirable work on the subterranean quarries in the limestone hills near Maestricht (Paris, 1821). He returned to France in 1820, and wrote for Liberal journals, and for Courtin's *Encyclopédie*. In 1827 appeared his *L'Homme, essai zoölogique sur le genre humain*. He rendered an important service to science by editing the *Dictionnaire classique de l'histoire naturelle* (1836). When, in 1829, the French Government sent a scientific expedition to the Morea and the Cyclades, the first place in it was assigned to him; and the results of his researches are given in his *Expédition scientifique de Morée* (Paris and Strassburg, 1832) and in the *Nouvelle flore du Péloponnèse et des Cyclades* (Paris, 1838). In 1839 he undertook the principal charge of the scientific commission which the French Government sent to Algeria.

BORYSTHENES, bō-rĭs'thē-nēz. See DNIEPER.

BORZNA, bōrz-nä'. A town in the Russian Government of Tchernigov, situated a short distance north of the Desna and about 90 miles southeast of the town of Tchernigov (Map: Russia, D 4). It has a number of tanneries and oil-presses, and a population of (1897) 12,458.

BORZOI. A Russian wolfhound. See GREYHOUND; WOLFHOUND.

BOS, bŏs, LAMBERT (1670-1717). A Dutch philologist. He was born at Workum, West Friesland, studied at the University of Franeker, and in 1704 was there appointed professor of Greek. All his works are characterized by thorough scholarship and remarkable acuteness. They include *Vetus Testamentum ex Versione Septuaginta Interpretum* (1709; new ed. 1805); *Ellipses Græcæ* (1702; last reëdited in 1808); *Antiquitatum Græcarum Præcique Atticarum, Descriptio Brevis* (1714; Eng. trans., 1839); and *Animadversiones ad Scriptores Quosdam Græcos* (1715).

BOSA, bō'sä. An episcopal city in the Province of Cagliari, Sardinia, on the west coast, near the mouth of the Temoe (Map: Italy, C 7). It is an unhealthy town, surrounded by decaying walls, has an old castle, a cathedral, coral fisheries, and tanneries, and is visited fortnightly by coasting steamers. The country produces wine and oil. Population, in 1881 (commune), 6696; in 1901, 6846.

BOSANQUET, bō'săn'kā', BERNARD (1848—). An English philosopher. He was born at Rock Hall, Alnwick, and was educated at Oxford. He has been president of the Aristotelian Society and of the London School of Ethics and Social Philosophy. From 1871 to 1881 he lectured at University College, Oxford. He is largely engaged in social work, particularly in connection with the Charity Organization Society. Among his numerous important publications are the following: *Civilization of Christendom* (1893); *Essentials of Logic; Aspects of the Social Problem* (1895); *Philosophical Theory of the State*. He has also edited a translation of Lotze's *System of Philosophy* (London, 1887).

BOSBOOM-TOUSSAINT, bŏs'bōm-tōō'săn'. See TOUSSAINT, ANNE LOUISE GEERTRUIDA.

BOSC, bŏsk, LOUIS AUGUSTIN GUILLAUME (1759-1828). A French naturalist. He visited the United States in 1796 to study the natural history of America, and afterwards traveled in Italy, and was a professor at the Versailles

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Zoölogical Garden. He was the author of *Histoire naturelle des coquilles* (1801); *Histoire naturelle des vers et des crustacées; Nouveau dictionnaire d'histoire naturelle* (1803); *Dictionnaire raisonné et universel d'agriculture* (5 vols., 1801); and published the *Mémoires* of his adopted daughter, Madame Roland, the Girondist (Paris, 1886).

BOSCAN-ALMOGAVER, bō-skän' äl'mō-gä-vär', JUAN (c.1493-c.1542). A Spanish poet, He was born in Barcelona, of an old patrician family, served for a time in the army of Ferdinand the Catholic, and in 1519 went to Granada, the Court of Charles V., becoming soon after tutor to the Duke of Alva. His later years were passed in Barcelona, and he died near Perpignan, in 1542, while visiting his former pupil. Boscan's earlier verse was all cast in the old Castilian measures. It was not until 1526 that the idea of experimenting with Italian metres was suggested to him by a certain Andrea Navagero, a learned Italian who was then Ambassador of Venice at the Court of Charles V. He forthwith began to experiment with sonnets and canciones, blank verse, and the octave stanza, and has naïvely recorded his satisfaction with the result. The innovation was adopted and still more successfully popularized by his friend and disciple, Garcilaso de la Vega (q.v.), and thus he became the founder of a new school of Spanish poetry. He is also remembered as the translator of Castiglione's famous manual for courtiers, *Il cortegiano*. Boscan's poems were published after his death by his widow, together with some of Garcilaso's, in 1543. The latest edition, including a biographical sketch, is that of W. T. Knapp (Madrid, 1875).

BOS'CAWEN, EDWARD (1711-61). An English admiral, popularly known as 'Old Dreadnought.' He was born August 19, 1711, and was the second son of Viscount Falmouth. He entered the navy in his fifteenth year, passed his examination for lieutenant in 1732, and in 1738 received a command. He won distinction at the taking of Porto-Bello and at the siege of Cartagena in 1740. He had an important share in the victory off Cape Finisterre (May 3, 1747). In 1751 he became a lord of the Admiralty. In 1755 as vice-admiral he intercepted the French fleet off Newfoundland, capturing two 64-gun ships and 1500 men, including the French commander, Hoquart, whom he had taken prisoner twice before. In 1758, as Admiral of the Blue, he was commander-in-chief of the expedition against Cape Breton, capturing that island and Saint John's after some hard fighting. The crowning success of his career was the defeat he inflicted on the French Toulon fleet, in the Bay of Lagos, August 18, 1759. For this he received the thanks of Parliament, a pension of £3000 a year, a seat in the privy council, and the command of the marines. He died near Guildford, January 10, 1761. Consult: Norway, "Admiral Boscawen, 'Old Dreadnought,'" in *Cornish Magazine*, Vol. II. (Truro, 1899); Standing, "Sir Edward Boscawen, K.C.B, Admiral of the Blue," *United Service Magazine*, Vol. CXIII. (London, 1900).

BOSCH, bōsh, ERNST (1834—). A German painter. He was born at Crefeld, and studied at the Düsseldorf Academy. In 1854 he exhibited "The Smuggler." His works excel through buoyancy and humor. They include "Gipsy Gang" (1866); "Rogues' School" (1866); and "Far Sighted and Near Sighted" (1873).

BOSCH, bōs, HIERONYMUS (properly VAN AKEN) (1462-1516). A Dutch painter. He was born at Hertogenbosch (Bois-le-Duc), whence his name, and affected fantastic subjects, particularly the torments of the damned. His chief work, "The Last Judgment," is in the Vienna Academy.

BOSCH, HIERONYMUS DE (1740-1811). A Dutch poet and philologist, born in Amsterdam. He was a philologist of varied acquirements and an accomplished Latin poet. His *Poemata* first appeared at Leyden in 1803 (2d ed., 1808). He rendered an important service to classical literature by his edition of the *Anthologia Græca*, with a metrical translation by Hugo Grotius, never before published (4 vols., 1795-1810, to which Van Lennep added a fifth volume, 1822). His discourses and treatises on subjects of literature, which are mostly composed in the Dutch language, display profound learning, excellent judgment, and refined taste.

BOSCHBOK, bōsh'bŏk. The Dutch form of 'bushbuck' (q.v.).

BOSCH'VARK (Dutch *bosch*, wood, bush + *vark*, hog). The South African river-hog (*Potamochœrus Africanus*). See RIVER-HOG.

BOS'COBEL ('Fairwood,' from It. *bosco*, thicket, OE. *bosch*, *bosk*, Engl. *bush* + *bel*, *bello*, beautiful). An English farmhouse near Shifnal, Shropshire, famed as the hiding-place of Charles II. after his defeat by Cromwell, at Worcester, September 3, 1651. With Major Carlis or Careless, who had led the forlorn hope at Worcester, he climbed the 'Royal Oak' in Boscobel Wood, and was concealed in its thick foliage for twenty-four hours, while Puritans in quest of him passed to and fro, unaware of his presence. The farmhouse still stands, and the oak is represented by a tree grown from one of its acorns.—The title of BOSCOBEL TRACTS has been given to certain contemporaneous writings, published in 1662, giving a graphic description of this passage of the monarch's life.

BOSCOREALE, bōs'kō-rā-ä'lā (It. *bosco*, forest, Engl. *bush* + *reale*, royal). A city in the Province of Naples, south Italy, a mile and a half from Pompeii (Map: Italy, F 2). Its name was brought to the notice of the world in 1895, when Baron Edmond de Rothschild presented to the Louvre a mass of First-Century silverware discovered in the excavation of a villa there. In the collection are 40 vases, jugs, bowls, etc., and 100 small pieces. The chief trade of the town is in wine and silk. In 1850 a stream of lava from Vesuvius, about a mile and a half broad and 12 feet deep, divided only just in time to leave Boscoreale unharmed, the fiery torrents destroying the woods on either side. Population, in 1881 (commune), 8756; in 1901, 9340. Consult: Héron de Villefosse, "Le trésor de Boscoreale," in *Monuments et mémoires de l'Institut de France*, Vol. V. (Paris, 1899); *Boscoreale Collection* (New York, 1898).

BOS'COVICH, RUGGIERO GIUSEPPE (1711-87). A celebrated Italian mathematician and astronomer, born in Ragusa. At an early age he joined the Jesuits, and spent his life in scientific pursuits and important public labors. Before the completion of his course of studies in Rome, he

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was appointed teacher of mathematics and philosophy in the Roman College there. In 1758 he published his famous work, *Theoria Philosophiæ Naturalis Redacta ad Unicam Legem Virium in Natura Existentium*, in which he advanced a molecular theory of matter, maintaining that substances consist of a system of material points which attract or repel each other, according to the distance between them. In 1764 he was appointed to a professorship at Pavia. After the suppression of the Jesuit order, he went to Paris, in 1774, and received a pension from the King. In 1783 he went to Bassano, to superintend an edition of his works, on the completion of which he returned to Milan, but fell into a depression of spirits, which at last grew into complete insanity. His works, which were the first to advocate in Italy the theories of Newton, include dissertations on a great variety of important questions in mathematical and physical science, and were published collectively under the title, *Opera Pertinentia ad Opticam et Astronomiam* (5 vols., 1785).

BOSE, bō'*ze*, JULIUS, Count (1809-94). A Prussian general, born at Sangerhausen. In 1861 he entered the Ministry of War, where he was active in the reorganization of the army. During the War of 1866 he conducted the celebrated night attack on Podol, which resulted in the retreat of the Austrian brigade. He was commander of the Eleventh Army Corps in the Franco-Prussian War, but, in consequence of severe wounds received at the battle of Wörth (August 6, 1870), he was prevented from further participation in that campaign.

BOSIO, bō'zê-ô, FRANÇOIS JOSEPH, Baron (1769-1845). A French sculptor. He was born at Monaco, March 19, 1769, and rose to eminence in the reign of Louis XVIII. He was a pupil of Pajou, but his work was influenced by the study of the antique. He has left behind him many examples of his talent and industry. His prominent works in Paris are a bronze group of "Hercules Struggling with a Serpent" in the garden of the Tuileries, an equestrian statue in the Place des Victoires, the triumphal chariot of the arch in the Place du Carrousel. The "Nymph Salmacis" and a "Hyacinth" are in the gallery of the Louvre. He executed many busts of the royal family, and the figure of the King of Rome. In 1830 Bosio completed the monument of the Countess Demidoff. He was the recipient of many honors. Louis XVIII. made him Court sculptor, and Charles X. made him a baron. He was a member of the French Institute and of the Royal Academy of Fine Arts in Berlin. Consult: Richard Muther, *History of Modern Painting* (London, 1896); A. G. Radcliffe, *Schools and Masters of Sculpture* (New York, 1894).

BOSNA-SERAI, bŏs'nä-sä-rī'. See SERAJEVO.

BOSNIA, bŏz'nĭ-ä (from the river *Bosna*, an affluent of the Save). Previous to 1878 the northwesternmost portion of the Turkish Empire, now (together with Herzegovina) virtually a province of Austria-Hungary. Bosnia (with Herzegovina) is bounded by Croatia and Slavonia on the north and west: Servia, the Turkish district of Novipazar (occupied by Austro-Hungarian forces), and Montenegro on the east: and Dalmatia on the southwest (Map: Austria-Hungary, E 4). Its area, including Herzegovina, is about 19,700 square miles; exclusive of Herzegovina, about 16,170 square miles. The surface of Bosnia is exceedingly mountainous, a large portion being covered by the numerous offshoots of the Dinaric Alps. The highest summit rises nearly 8000 feet above sea-level. The northern chains are generally well wooded, and inclose fertile valleys, while the mountain regions of the south are mostly rocky and barren. On the northern frontier the country inclines toward the Save. The chief rivers are the Save, which forms most of the northern boundary, and the Drina, which separates Bosnia from Servia. The southern part is watered chiefly by the Narenta. There are, besides, several minor streams, such as the Vrbas, the Bosna, and a few others. The climate is generally healthy, but exceedingly variable. The average annual temperature at Serajevo is over 48°, but the mercury falls in the winter as low as —2°, while in the summer it rises occasionally to 95°. Bosnia is principally an agricultural country, agriculture engaging nearly 90 per cent. of the population. The methods employed are of a primitive character, and extensive areas of fruitful land remain uncultivated. The chief European cereals are raised, and much attention is paid to the cultivation of fruits, especially plums, of which great quantities are exported in a dry state. Tobacco is an important product, the annual crop amounting to over 3000 tons. Sugar-beets are also grown, and silk-culture has been introduced. The Austro-Hungarian Government has recently taken steps toward furthering the agricultural interests of Bosnia by establishing several agricultural experiment stations and model farms. Sheep and goats are raised extensively, while horned cattle and horses receive less attention. The mountains of Bosnia are rich in minerals, some of which were worked in the days of the Romans. The mineral industry is chiefly in the hands of the Government. The chief mineral products are iron, copper, manganese, quicksilver, coal, and salt. The manufacturing industries are also in a backward state, and are confined chiefly to the production of coarse metal articles and some textiles for the home market. There are several extensive State tobacco factories. The exports consist mainly of cereals, fruit, animals, and animal products. Since the Austro-Hungarian occupation the transportation facilities of Bosnia have been considerably extended and improved. In 1901 there were over 600 miles of railway lines, extending from Serajevo to all parts of the province. The highways and telegraph lines have also increased in length. The social and economic condition of Bosnia presents strange contrasts in the intermingling of institutions and customs handed down from the past with the innovations that reflect the spirit of modern progress.

In accordance with the agreement of 1878, the supreme control of the province is nominally vested in the hands of the Sultan of Turkey, but the immediate administration is directed by the Bosnian Bureau, under the supervision of the Minister of Finance of Austria-Hungary. The provincial government is divided into the four departments of internal affairs, finance, justice, and public works. For administrative purposes Bosnia is divided into 5 districts and 43 counties, administered by separate officials, with the assistance of representative councils. The annual bud-

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get amounts to a little over 40,000,000 kronen ($8,120,000). The Austro-Hungarian Government maintains an army of about 20,000 men. Military service is compulsory for every able-bodied male for a period of three years. Education is free, but not compulsory, and, although the number of schools, as well as the standard of instruction, has been raised since the Austro-Hungarian occupation, education is still very backward, and a large proportion of the population is illiterate. The population of Bosnia and Herzegovina in 1895 was 1,591,036, against 1,336,091 in 1885. According to religion, they were divided as follows: Greek Orthodox, 42.94 per cent.; Mohammedans, 34.99 per cent.; Roman Catholics, 21.31 per cent.; Jews, 0.52 per cent. The inhabitants, Bosniaks and Herzegovinians, belong to the Serb branch of the Slavic race, with stature for soldiers of 1.710 metres. In the necropolis of Glasinæ, with its 20,000 tumuli, were found crania which show that the dolichocephalic Hallstatt race was once as pronounced here as is the opposite type to-day. With a few unimportant exceptions, the people speak the Serb language. The Mohammedans, who call themselves Turks, are descendants of Slavic Christians converted to Islam during the Mohammedan conquest, and do not adhere so closely to Islam as the Mohammedan inhabitants of the Turkish provinces. The Turkish element of the population is insignificant. There is an Albanian element in the south. Capital Serajevo, with a population of about 38,000.

Bosnia constituted a part of the Roman provinces of Dalmatia and Pannonia, and was celebrated in ancient times for its rich mines of silver and gold. After the passing of the Goths the region was occupied by a Slav population, about the beginning of the Sixth Century. For a long time the various parts of the country had their own petty princes. The Bosnian rulers begin to figure under the name of Ban in the Twelfth Century. About this time the heretical Christian sect of Patarenes rose to importance. In the course of the Middle Ages the country passed through periods of Servian, Croatian, and Hungarian overlordship. A succession of powerful chiefs extended the limits of the principality over Dalmatia and a part of Servia, and in 1376 Ban Tvertko proclaimed himself King of Bosnia. In 1401 came the beginning of Turkish invasion, which burst upon the country in all its force in 1463. The Turks now made themselves rulers of nearly the whole of Bosnia, and the fragment which had become attached to Hungary fell into their hands after the battle of Mohács in 1526. Bosnia became thoroughly Islamized, and submitted quietly to the ruthless Ottoman rule. In 1850-51 the Mohammedan nobility, crushed by the heavy weight of taxation, rose in arms against the Porte, but the revolt was stamped out with sanguinary efficacy by Omer Pasha. An unsuccessful insurrection in Bosnia and Herzegovina took place in 1875-76, and was followed by Servia's disastrous war with Turkey. The facts of Turkish misgovernment were recognized at the Congress of Berlin (1878), and Austria-Hungary was authorized to occupy and administer Bosnia and Herzegovina, though the Sultan retained the nominal suzerainty over them. The Austro-Hungarian occupation was effected in 1878, but only after a desperate resistance on the part of the Mohammedan inhabitants. In 1881 compulsory military service was introduced. The administrative order and military organization of Bosnia have been assimilated to the Austro-Hungarian system. Bosnia has made great strides under the Austro-Hungarian rule, its prosperity being in great measure due to the wise and vigorous administration of Baron Kállay.

Consult: Miller, "Bosnia Under the Austrians," *Gentleman's Magazine*, CCLXXXV. (London, 1898) and *Travels and Politics in the Near East* (1899); Munro, *Rambles and Studies in Bosnia* (Edinburgh, 1895); Diehl, "En Bosnie-Herzégovine," *La grande revue*, Vol. XVII. (Paris, 1901).

BOS'PORUS, or **BOSPHORUS** (Gk. Βόσπορος, *Bosporos*, literally *ox-ford*, from βοῦς, *bous*, ox, cow + πόρος, *poros*, ford, crossing. Called also the Strait of Constantinople). The narrow channel which connects the Black Sea with the Sea of Marmora and separates the two continents of Europe and Asia (Map: Turkey in Europe, G 4). It has a length of about 18 miles, and in width varies from about 1800 feet to about two miles, with a depth of over 100 feet.

The surface currents are from the Black Sea to the Sea of Marmora, while underneath and along the shore the direction is opposite, which fact accounts for the undiminished salinity of the Black Sea, in spite of the great quantities of fresh water which it receives through its affluents. The swift currents and the occasional fogs which envelop the northern entrance make the channel very dangerous for navigation, and a number of lighthouses have been erected to insure greater safety. The shores are for the most part elevated, and in the vicinity of Constantinople are lined with palaces, picturesque villages, vineyards, and numerous ancient ruins. The name Bosporus, which means an ox-ford or a cow-ford, is supposed to have been derived from the legend according to which the strait was crossed by Io after she was transformed into a cow. Other authorities attribute the name to the narrowness of the channel, which makes it possible for an ox to cross it. The channel was also known at one time as the Thracian Bosporus. At the middle of this strait, where it is about 2800 feet in breadth, Darius made his bridge of boats when he marched against the Scythians. The Bosporus has long been under Turkish control. Repeated European conferences, including that of Berlin, in 1878, have confirmed the stipulation of the treaty made in 1841, providing that no ship of war belonging to any nation but Turkey shall pass through the Bosporus without the consent of the Ottoman authorities.

BOSPORUS, KINGDOM OF. An ancient Greek State on both sides of the Cimmerian Bosporus (the Strait of Yenikale, connecting the Sea of Azov with the Black Sea). It was founded probably about the beginning of the Fifth Century B.C. in the Tauric Chersonesus (Crimea). In 393 the kingdom was extended along the Asiatic coast, and Theodosia was united with it in 360. The kingdom became tributary to the Scythians in 290, and toward the close of the Second Century B.C., Mithridates, King of Pontus, vanquished the Scythians and set his son, Machares, on the throne of Bosporus.

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On the death of Machares, soon followed by that of Mithridates, the Romans gave the country in B.C. 63 to Pharnaces, the second son of Mithridates, and after his assassination to several princes who gave themselves out for descendants of Mithridates. When at last the family became entirely extinct, in A.D. 259, the Sarmatians made themselves masters of the kingdom.

BOSQUET, bōs'kâ', PIERRE FRANÇOIS JOSEPH (1810-61). A marshal of France. He was born at Mont de Marsan, in the Department of Landes, November 8, 1810, entered in 1829 the Polytechnic School in Paris, and in 1838 joined the artillery as sub-lieutenant. He became colonel in 1847, general of brigade in 1848, and general of division in 1854. In the earlier part of his career he displayed such skill and valor in several Algerian campaigns that he was intrusted with the Second Division of the French Army in the Crimean War, 1854-55, in which he especially distinguished himself at the Alma, Inkerman, and at the storming of the Malakoff. Having been seriously wounded at Sebastopol, he was compelled to retire from active service, and France, in recognition of his services, made him Senator and field-marshal. The British Parliament voted its thanks to him in a special resolution.

BOSS, bōs (Fr. *bosse*, probably OHG. *bōzo*, tuft, bunch, *bōzan*, MHG. *bôzen*, to beat). In architecture, a raised ornament, usually that of the projecting keystone at the intersection of ribbed vaulting. The term is extended to similar projections on running moldings. It first became common in developed Gothic work, where bosses were usually enriched with figures or foliage in high relief and of great beauty. (See BOSSAGE in its first meaning.)—The boss of a bit is the ornament with which a bridle-bit terminates at each end.

BOSS. A term derived from the Dutch *baas*, originally meaning a master, overseer, or superintendent of any kind. So a *boss* shoemaker or carpenter is the head of a gang of shoemakers or carpenters, who deals out work to them and fixes the amount of their pay. The term seems to have arisen from aversion to the word 'master,' regarded as savoring too much of the relations between master and slave, and it has come largely into use among the American negroes since their emancipation. In the vocabulary of American politics it denotes a professional politician who regards the public service as a means of rewarding his personal friends, and of buying the support of the ignorant and unscrupulous. In this sense the word came into general use at the time of the exposure of the Tweed Ring in New York City in 1872.

BOSS, LEWIS (1846—). An American astronomer. He was born in Providence, R. I., graduated in 1870 at Dartmouth College, and from 1872 to 1876 was astronomer of the United States northern boundary commission. In connection with the determination of the latitude of various specified points on the boundary line, he compiled a list of the *Declinations of Fixed Stars* (Washington, 1878), which forthwith made him favorably known. In 1876 he was appointed director of the Dudley Observatory at Albany, N. Y., which, through his efforts, was reconstructed in 1893, and provided with an increased endowment. He was chief of the expedition sent in 1882 by the United States Government to Santiago, Chile, to observe the transit of Venus, is an honorary member of the Royal Astronomical Society, and variously connected with other learned bodies, and has published, besides many monographs, a *Catalogue of 8241 Stars* (1890), a contribution to the coöperative catalogues of the stars prepared by leading scientists of the Continent.

BOS'SAGE (for derivation see BOSS). A term used in two senses: either (1) to denote the stones in a building left rough and projecting, afterwards to be worked into a decoration, as in carved Gothic keystones (see BOSS), or in memorial tablets; or (2) to designate stones left in the same rough manner as a permanent feature, as in the rustic masonry of Florentine palaces.

BOSSCHA, bōs'sâ. JOHANNES (1831—). A Dutch physicist. He was born in Breda, and was educated in Deventer and Leyden. He became director of the Polytechnic School in Delft in 1878. He has made important investigations on galvanic polarization, the rapidity of sound-waves, the mechanical theory of electrolysis, and he was one of the first (1855) to suggest the possibility of sending two messages simultaneously over the same wire.

BOSSE, bōs, ABRAHAM (1611-78). A French engraver and etcher, born in Tours. He taught perspective in a special school of design in Paris, and subsequently was a professor at the Royal Academy of Painting. Most of his bold and spirited plates were executed from his own designs. He published a *Traité des manières de graver en taille douce* (1645), and other works.

BOSSE, bōs'se, ROBERT (1852—). A German statesman. He was born at Quedlinburg, and studied law at the universities of Heidelberg, Halle, and Berlin. He became Under-Secretary of State in the Ministry of the Interior in 1889, in which capacity he had the principal share in the preparation of the laws providing insurance for workingmen. In 1891 he was appointed Secretary of State in the Imperial Ministry of Justice, and he was chairman of the commission intrusted with the preparation of the new Civil Code of Germany. His appointment as Prussian Minister of Education in 1892 followed. In 1883 he became editor of the *Monatsscrift für Deutsche Beamte* (Berlin). Among his publications are: *Kommentar zum Invaliditäts- und Altersversicherungsgessetz* (3d ed., 1891); *Eine Dienstreise nach dem Orient* (1900).

BOSSI, bōs'sê, ENRICO MARCO (1861—). An Italian composer, born at Salò. He studied at the Milan Conservatory, became organist in the cathedral of Como, and subsequently instructor in the theory and practice of organ-playing in the conservatory of Naples. He has written chamber music; requiem masses; an organ concerto; an opera, *Il Cieco* (first presented at Venice in 1898); and *Canticum Canticorum*, a biblical cantata, rendered for the first time in 1901 with much success by the Cäcilienverein of Frankfort-on-the-Main, Germany. His *Metodo di studio per l'organo moderno* (1893; with G. Tebaldini) is an extremely valuable work.

BOSSI, GIUSEPPE (1777-1815). An Italian painter and writer on art. He was born at Busto Arsizio, August 11, 1777, and studied in

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Milan, but also passed several years in Rome in close association with artists of the Italian school. On his return to Milan he was made secretary of the Academy of Fine Arts, and for his services in that academy and those of Bologna and Venice, he was, in 1804, awarded the decoration of the Iron Crown. In 1805 he exhibited a drawing of Michelangelo's "Last Judgment." He copied the "Last Supper" of Leonardo in order that this great work, almost obliterated, might be reproduced in mosaic by Rafaelli. In 1810 Bossi published *Del cenacolo di Leonardo da Vinci*, which attracted the interest of Goethe. On his death, December 15, 1815, a monument by Canova was erected to his memory in the Ambrosian Library in Milan. Much of Bossi's life was devoted to the study of the works of Leonardo, and his last work was a series of drawings representing incidents in the life of that master. He left unfinished a large cartoon in black chalk of "The Dead Christ in the Bosom of Mary, with John and Magdalene."

BOSSI, LUIGI, Count (1758-1835). An Italian antiquary and historian. He was born in Milan, studied in Pavia, and became a canon of the Cathedral of Milan; but when the French entered Italy he took the side of the invaders, and was appointed by Bonaparte agent of the French Government in Turin, and afterwards prefect of the archives of the kingdom of Italy. He was an extremely prolific author, and produced more than eighty works on antiquarian, historical, and art subjects. The best known of his antiquarian writings is *Observations sur le vase que l'on conservait à Gènes sous le nom de Sacro Catino* (1807). His most important historic works are a much-enriched translation of Roscoe's *Life of Leo X.*, 12 vols. (1816-17); *Vita di Cristoforo Colombo* (1818); and *Istoria d'Italia*, 20 vols. (1819-23).

BOSSUET, bô'swâ', JACQUES BÉNIGNE (1627-1704). A distinguished French pulpit orator. He was born September 27, 1627, in Dijon; received his earlier education in the Jesuit College there; and then went to Paris to the College of Navarre, where he studied the Sacred Scriptures, the works of classical antiquity, and the Cartesian philosophy. In 1652 he was made a priest, and a doctor of theology, and canon in Metz. Here he was called by the bishop to reply to the catechism of the Protestant minister, Paul Ferri, and this he did (1655) in a way that commanded the admiration even of Protestants. He soon attained great distinction as a pulpit orator, and in 1661 he was made preacher to the Court. His discourse on the occasion of Marshal Turenne's conversion to the Catholic Church obtained for him the bishopric of Condon (1669). Louis XIV. having in 1670 intrusted to him the education of the Dauphin, he resigned his bishopric in 1671, because he believed that he would be unfaithful to his duty if he retained it during a continued absence from his diocese. He was now made a member of the Academy. The care with which he attended to the education of the Dauphin was rewarded, in 1680, by his nomination as first almoner of the Dauphin, and in 1681 by his appointment to the bishopric of Meaux. He was the author of the four articles which secured the freedom of the Gallican Church, and the rights of the King in regard to it, against the aggressions of the Pope; and his eloquence in the famous assembly of the French clergy in the year 1682 secured the adoption of these articles. In 1697 he became a member of the Council of State, and in the following year first almoner to the Duchess of Burgundy. He spent the last year of his life in his diocese, but died in Paris, April 12, 1704. He was alike strict in morals and in religious doctrine; his strictness in the latter he showed particularly in his controversy with Fénelon, whom he accused of heresy for his defense of the Quietists (q.v.). Bossuet is considered the greatest ecclesiastical orator known in history. His orations at the funerals of the Duchess of Orleans and the great Condé are particularly famous as masterpieces of this kind of eloquence. All his writings attracted much attention. For the defense of those dogmas of the Catholic Church which are rejected by the Protestants he wrote his *Exposition de la doctrine de l'église catholique sur les matières de controverse* (Paris, 1671).

His greatest controversial work is his celebrated *Histoire des variations des églises protestantes*, 2 vols. (1688), in which he founds his arguments chiefly upon the doctrinal diversities of the churches of the Reformation. To the defense of the four articles of the Gallican Church he devoted his *Defensio Declarationis Celeberrimæ, quam de Potestate Ecclesiæ Sanxit Clerus Gallicus a.* [1682], 2 vols. (1730). With a view to the instruction of the Dauphin, he wrote his *Discours sur l'histoire universelle jusqu' à l'empire de Charlemagne* (1681), a work particularly deserving of notice, as the first attempt at a philosophical treatment of history. The continuation of it to the year 1661 (1805) is entirely derived from materials which he left behind him, but to which the last touch of his own hand was wanting. Another fruit of his political and historical studies was the *Politique tirée de l'Ecriture Sainte* (1709). There are modern English translations of the following: *Select Sermons and Funeral Orations* (London, 3d ed., 1801); *A Conference on the Authority of the Church* [1679] (1841); *A Survey of Universal History* (1819); *Elevations to God* (1850); *An Exposition of the Catholic Faith* (new edition, 1841); *The History of the Variations of the Protestant Churches* (2d ed., Dublin, 1836, 2 vols.); A. Rebellian, *Bossuet, historien du protestantisme, Etude sur l' "Histoire des variations"* (Paris, 1892); *Sermon on the Mount* (New York, 1900); *Meditations* (London, 1901). His works appeared in Paris, 1862-66, 31 vols., appendix *Œuvres inédits* (1881-83, 2 vols.). For his life, consult: A. Réaume, 3 vols. (Paris, 1869-70); G. Lanson (Paris, 1891); François Ledieu (Bossuet's secretary), *Mémoires et journal sur la vie et les ouvrages de Bossuet*, 4 vols. (Paris, 1855-57); and Mrs. H. L. Sidney Lear (London, 1880). —His nephew, JACQUES BOSSUET, died bishop of Troyes, July 12, 1743. His very extensive correspondence, chiefly devoted to the elucidation and investigation of the views of Fénelon, is included in the above-mentioned edition of the works of his uncle.

BOSSUT, bô'sụ', CHARLES (1730-1814). A French mathematician and physicist, born at Tartar, near Lyons. He studied with the Jesuits in Lyons, and received his ordination. In 1752

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he became professor of mathematics at Mézières, and in 1768 was received into the Academy of Sciences. The Revolution deprived him of his situation and his income, and he lived in the greatest seclusion, till under the Empire he was appointed a professor in the Polytechnic School. His works are very numerous. The following may be mentioned as particularly valuable: *Recherches sur la construction la plus avantageuse des digues* (1764); *Recherches sur les altérations que la résistance de l'éther peut produire dans le mouvement des planètes* (1776); *Nouvelle expérience sur la résistance des fluides par d'Alembert, Condorcet, et Bossut* (1777); *Traité élémentaire de mécanique et de dynamique* (1763); *Cours complet des mathématiques*, 7 vols. (1795-1801); *Cours de mathématiques à l'usage des écoles militaires* (1782); *Essai sur l'histoire générale des mathématiques* (2d ed., 1810); and *Traité du calcul différentiel et intégral* (1798). He was a great admirer of Pascal, and edited his works (15 vols., Paris, 1779), to which he prefixed an introductory *Discours sur la vie et les ouvrages de Pascal*, in 5 vols. Bossut is especially entitled to fame for his researches in experimental hydrodynamics, which have formed contributions of great importance to that science. He is best known, however, for his history of mathematics mentioned above, a work which, while open to serious criticism, awakened much interest in the subject.

BOSTAN'GI (from Turk. *bostan*, Pers. *bustān*, garden). A class of men in Turkey who, originally the Sultan's gardeners, now perform a variety of duties, such as mounting guard at the seraglio and rowing the Sultan's barge. Their chief, called Bostangi Bashi, holds the rank of pasha, is governor of the Sultan's residences, and chief of police of the capital. The bostangi at one time numbered 3000, and were united with the janissaries in military duty. In war time their strength was 12,000. Their present number is about 600.

BOSTON, bŏs'ton *or* bŏs'- (Saint Botolph's town'). An ancient English borough and seaport in Lincolnshire, on both sides of the Witham, 28 miles southeast of Lincoln (Map: England, G 4). Boston is supposed to be the ancient Icanhoe, the site of the abbey founded by Saint Botolph in 654. After the conquest it became an important trading town and the home of a Hanseatic guild. Henry VIII. granted it a charter of incorporation. The ancient Guildhall is interesting historically as the place of trial of Brewster and his companions. The parish church of Saint Botolph (1309), 290 × 98 feet, is one of the largest without cross-aisles in England, and has a fine tower 290 feet high, surmounted by a lantern visible 40 miles out at sea. The church was partially restored in 1857, at the expense of the inhabitants of the town's American namesake. Boston returns one member to Parliament. The town owns extensive docks. The clearing of the river of silt and the closing of the adjacent fens have greatly promoted the trade of Boston. Population, in 1891, 14,570; in 1901, 15,700.

BOSTON. The capital of Massachusetts, and the county-seat of Suffolk County, the commercial metropolis of New England, and the fifth city of the United States in population (Map: Massachusetts, E 3). It is in latitude 42° 21′ 27″ N., longitude 71° 3′ 30″ W., 232 miles by rail northeast of New York City, on Boston Harbor, an arm of Massachusetts Bay, at the mouths of the Mystic and Charles rivers.

DESCRIPTION. The original site of Boston, including Beacon, Copp's, and Fort hills, all of which have been considerably cut down, though the first still rises to a height of 110 feet, was a peninsula of less than 800 acres in extent, connected with the mainland by an exceedingly narrow neck, one mile in length and so low that it was not infrequently submerged. The shore, deeply indented, was surrounded by tidal marshes, which have been filled in at great expense, adding over 1000 acres to the original area, a part of which, on the Charles River, is now the location of the well-known Back Bay district of the modern city. The limits of the old town have been extended to include East Boston, on Noddle's Island, added in Colonial times; South Boston, originally Dorchester Neck, annexed in 1804; Roxbury, in 1868; Dorchester, in 1870; and Charlestown, West Roxbury, and Brighton, in 1874—the modern Boston occupying a total area of about 43 square miles.

The appearance of the old town is still retained in the narrow and irregular streets of the North End, now one of the most squalid parts of the city. As historical relics remain three old burying-grounds—Copp's Hill Burial Ground, containing the graves of the Mathers; Central Burying-Ground, dating from 1756; and Old Granary Burial Ground, in which are buried several persons noted in history. A few old buildings are still standing — Christ Church (Old North Church) (1723), from the spire of which were hung the lanterns for Paul Revere; Faneuil Hall (q.v.); the old State House (1748), restored in 1882 as nearly as possible to its provincial appearance, one of the most noteworthy historic buildings in the United States and the repository of an interesting collection of relics and paintings; King's Chapel (1754), occupying the site of the first Episcopal church, of 1688, with the oldest cemetery in Boston: the Old Corner Bookstore, long known as a rendezvous of literary persons; and the Old South Meeting House (1729), with which are connected many notable events in the history of the city, and which now contains historic relics and in winter is used as a hall for lectures on American history.

The modern city has about 590 miles of streets, of which all but 95 miles are paved—the greater part with macadam, granite, Belgian blocks, and gravel. In the new sections they are handsomely laid out. Beacon Street and Commonwealth Avenue, the latter 240 feet wide and one of the finest boulevards in America, with other streets of the Back Bay region, are representative of the beauty of Boston's residential avenues. Washington and Tremont streets are the headquarters of the retail trade, and State Street is the important financial centre—the Wall Street of Boston. Intercommunication between the various districts of the city is afforded by an efficient street-railway system which operates about 200 miles of track, and by a number of bridges, East Boston alone being connected by ferry.

BUILDINGS. Boston is replete with objects of architectural interest. The State House, on Beacon Hill, built in 1795 after designs by Charles Bulfinch, and subsequently enlarged at various

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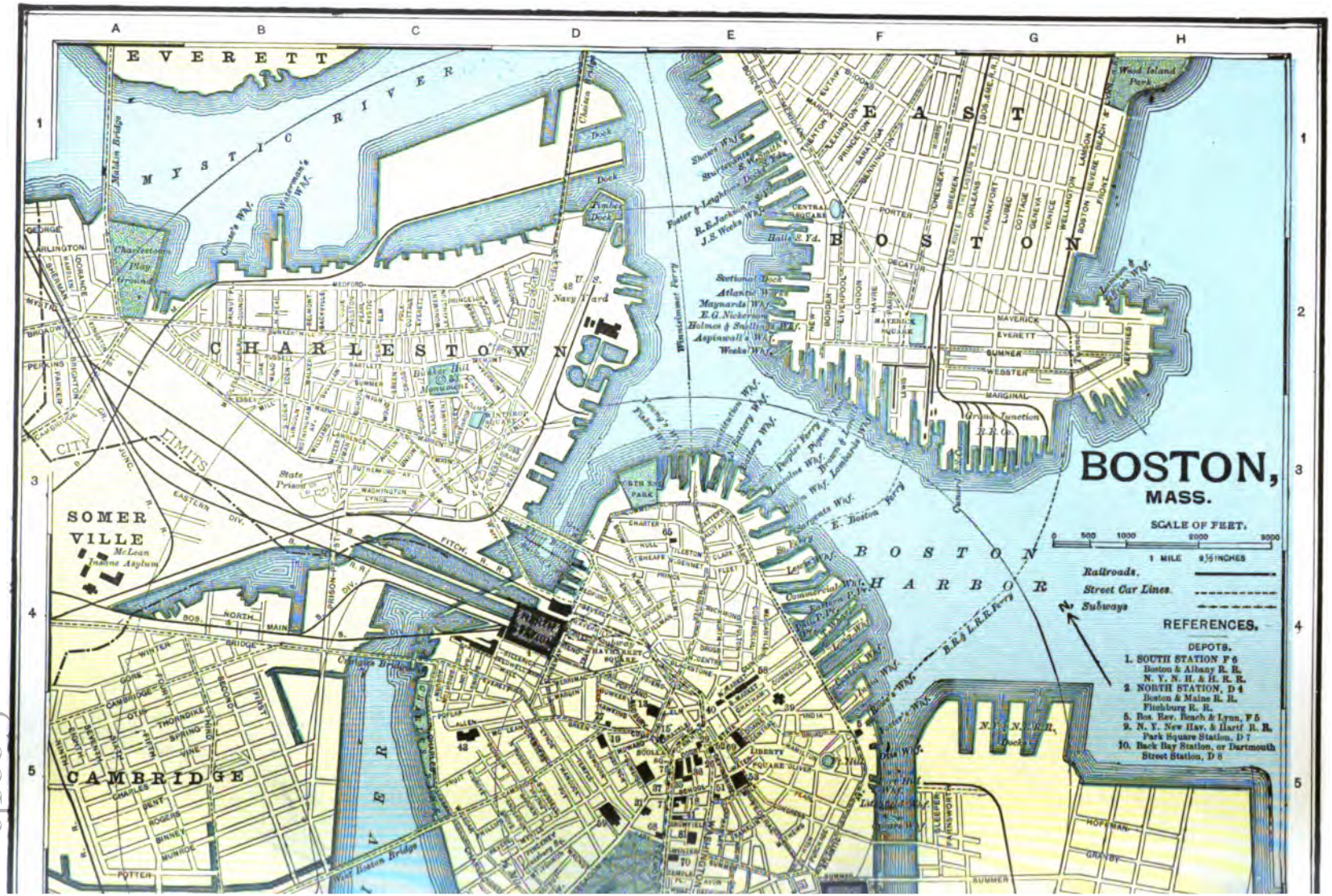
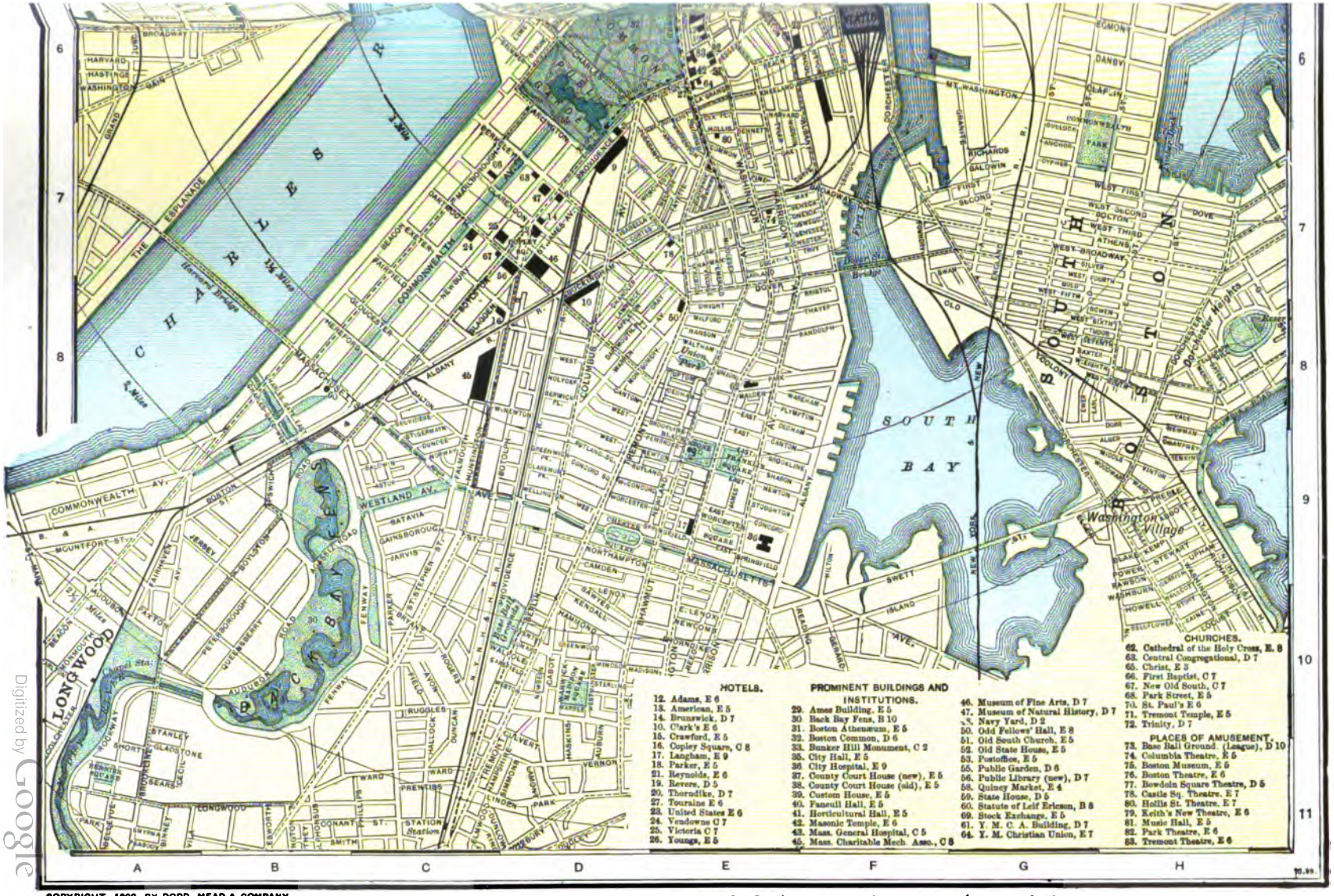

BOSTON,
MASS.
SCALE OF FEET.
0 500 1000 2000 3000
1 MILE 9.5 INCHES
Railroads.
Street Car Lines.
Subways
REFERENCES.
DEPOTS.
1. SOUTH STATION F 6
Boston & Albany R. R.
N. Y. N. H. & H. R. R.
2. NORTH STATION, D 4
Boston & Maine R. R.
Fitchburg R. R.
5. Bos. Rev. Beach & Lynn, F 5
9. N. Y. New Hav. & Hartf R. R.
Park Square Station, D 7
10. Back Bay Station, or Dartmouth Street Station, D 6
EVERETT
MYSTIC RIVER
CHARLESTOWN
SOMERVILLE
CAMBRIDGE
EAST BOSTON
BOSTON HARBOR
CITY LIMITS
U. S. Navy Yard
Bunker Hill Monument
State Prison
Charlestown Plain Ground
McLean Insane Asylum
Boston Common
Public Garden
Grand Junction R.R. Co.
Wood Island Park
Malden Bridge
Charlestown Bridge
West Boston Bridge
Chelsea Ferry
Winnisimmet Ferry
E. Boston Ferry
R.R. & L.R.R. Ferry
Liberty Square Office
Central Square
Maverick Square
Meridian Park
Chelsea Dock
Tudor Dock
Sections Dock
Atlantic Wharf
Maynards Wharf
E. G. Nickerson
Holmes & Snelling Wharf
Aspinwall's Wharf
Weeks' Wharf
Hall's Yd.
Foster & Leighton's Dock Yd.
R. R. Jackson
J. S. Weeks Wharf
Shore Wharf
Battery Wharf
Commercial Wharf
Lewis Wharf
Lombards Wharf
Brown & Lee
Pigeon
Boston Wharf
Atlantic Wharf
Hull Tilestone Wharf
Charlestown Wharf
Bunker Hill Wharf
Young's Wharf
Fisher Wharf
Mill Pond
Dock
N. Y. N. H. R. R. Dock
Sleeper Lock
Hoffman
Granby
Summer
Potter
Cambridge
Charles
Bent
Rogers
Binney
Munroe
Thorndike
Spring
Vine
Bridge
Cottage Bridge
Fitchburg R. R.
Eastern Div.
Washington
Lynde
Medford
Broadway
Perkins
Brighton
Parker
Sherman
Arlington
George
Tremont
Beacon
Charles
Cambridge
Bowdoin
Hancock
Pleasant
Tremont
Washington
Dover
Shawmut
Harrison
Albany
Kneeland
Lincoln
Beach
Kingston
Bedford
Chauncy
Summer
Franklin
Devonshire
Milk
Water
Federal
Pearl
Purchase
Oliver
Broad
Milk
Pearl
Federal
Franklin
Devonshire
Water
Kilby
Congress



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times, is a prominent structure some 400 feet long, crowned by a gilded dome. The Shaw Monument, by Saint Gaudens, the reproduction of the Beacon Monument which was erected in 1790, and statues of Daniel Webster and Horace Mann, are of interest in this locality. The City Hall, an Italian Renaissance structure, on School Street, is fronted by statues of Benjamin Franklin and Josiah Quincy, and the granite County Court House, a type of German Renaissance, is 450 feet long, erected at a cost of $2,500,000. On State Street stands the Custom House, of granite, in form a huge Greek cross; not far distant is the United States Government Building, which covers an entire block and accommodates the post-office, sub-treasury, and United States courts. The total cost of this edifice, including construction and land, was nearly $6,000,000.

Copley Square is perhaps the city's greatest architectural centre. Here are the Public Library, facing Trinity Church, and the Museum of Fine Arts, and the Second Unitarian and the New Old South churches. The library is built of Milford granite, in Italian Renaissance style, and is nearly square, inclosing an open court which contains a fountain by Martigny and is surrounded by a fine arcade. Over the main entrance are reliefs by Saint Gaudens, while the interior is richly decorated with colored marbles and mural paintings by well-known artists, among them Puvis de Chavannes, Edwin A. Abbey, and John S. Sargent. The entrance hall leads to a magnificent marble staircase flanked with lions. Statues of Emerson and Sir Harry Vane add to the interior decoration. The Boston Public Library is the largest free circulating library in the world. It has accommodation for 2,500,000 books and contains about 775,000 volumes, among which are included several valuable special collections, that of Shakespeariana being one of the finest in the world. The general reading-room (Bates Hall) is of spacious dimensions, 42 feet wide by 217 feet long, and extends across the Copley Square front. The churches on this square are worthy examples of ecclesiastical architecture, and, with the Roman Catholic Cathedral of the Holy Cross in Washington Street, the First Church of Christ (Scientist), and the First Spiritual Temple (Spiritualist) are perhaps the most striking church edifices in the city. The New Old South Church is in Italian Gothic, with a fine campanile and an interior noticeable for its rich marble. Trinity Church, by Richardson, said to be the finest church in New England, is a specimen of French Romanesque. It has the form of a Latin cross, and is particularly notable for its beautiful interior decorations and stained-glass windows. The Museum of Fine Arts, on the east side of the square, is of red brick, in Italian-Gothic style, and is the repository of works of inestimable value, the collection of Japanese art and that of antique casts being among the best in the world. Other points of interest in various parts of the city are the buildings of the Massachusetts General Hospital, the great Exchange Building, containing the Stock Exchange Chamber, the Chamber of Commerce, the tall Sears and Ames buildings, the Unitarian and Congregational buildings, the Masonic Temple, Tremont Temple, the *Youth's Companion* Building, the Natural History Museum, with a library and valuable collections, the Massachusetts Historical Society Building, the Armory of the First Corps of Cadets, and the new buildings of the New England Conservatory of Music.

In Charlestown are the famous Breed's Hill and Bunker Hill. In this section of the greater city the principal points of interest are the Bunker Hill Monument, a granite obelisk 220 feet high, which affords from the top an extensive view, and the navy yard, occupying nearly 90 acres, and containing machine-shops, ship-houses, etc., and a large granite dry-dock. Charlestown has also statues of Col. William Prescott and Gen. Joseph Warren, a soldiers' monument, and a monument to John Harvard.

PARKS. The Common, a most characteristic feature of Boston, esteemed by the people as few other public parks are, because of its intimate connection with the history of the city, was set off in 1634 as a training-field and common ground, and has since been carefully preserved for public use. Its 48 acres are crossed by paths shaded by grand old elms, while toward the centre, near where the 'Great Elm' stood until blown down in 1876, is the Soldiers' Monument, erected in memory of the men of Boston who "died for their country." Near the Tremont Street Mall stands the Crispus Attucks Monument, commemorating the 'Boston Massacre of 1770.' The bronze figure represents Revolution breaking the chains, and the scene of the massacre is portrayed in bas-relief on the base; the names of the victims are on the shaft. Adjacent to the Common is the Public Garden, of 24 acres, the entrance to the Back Bay district, tastefully laid out and in season a mass of brilliant flowers. It contains an artificial lake, spanned by a ponderous bridge, and an equestrian statue of Washington by Ball, statues of Edward Everett and Charles Sumner, a representation of "Venus Rising from the Sea," and the group by J. Q. A. Ward, commemorating the discovery of ether, first successfully used in 1846 by Dr. Morton, in an operation at the Massachusetts General Hospital.

Among other noteworthy statues of the city are a bronze statue of Governor Winthrop in Scollay Square, one of Samuel Adams in Adams Square, another of Governor Andrews in the State House, the statues of Alexander Hamilton, John Glover, William Lloyd Garrison, and Leif Ericson in Commonwealth Avenue, the statue of Farragut in the Marine Park, of Beethoven in the Music Hall, and of Columbus in front of the Roman Catholic Cathedral.

Owing to the natural beauty and accessibility of its suburbs, and the existence of the Common and the Public Garden in the heart of the city proper, Boston was late in initiating a system of public parks. There are now two phases of park development — the municipal, dating from the seventies, and the metropolitan, of more recent inauguration and of vast extent, requiring years for its completion as planned. The municipal system, of over 2600 acres, includes, besides numerous playgrounds and open-air gymnasia, and independent parks in various parts of the city, a chain of parks connected by fine parkways, and almost encircling the city from the Charles River Embankment to the Marine Park in South Boston. From its terminus at the Charles River, the boulevard extends through a narrow section, Charlesgate, to 'The Fens,' then by the narrow Riverway to Leverett Park, approaching Ja-

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maica Park with Jamaica Pond, passing the Arnold Arboretum, where may be found every tree and shrub that will grow in Boston's climate, reaching Franklin Park, of 520 acres, in West Roxbury, the central feature of the system, and ending with the Marine Park at City Point, South Boston. The Marine Park is connected by a pier with Castle Island, also a part of the park system. This locality is a popular headquarters for yachts, and affords facilities for boating and bathing (municipal bath-houses). The Metropolitan Parks District, in which are included a number of municipalities, is administered by a commission of five members, appointed by the Governor. The scheme comprises such reservations as the Blue Hills (4000 acres), Middlesex Fells (3200 acres), Stony Brook Woods (400 acres), connecting the first-named with the Boston municipal system at the Arnold Arboretum, Lynn Woods (2000 acres), Beaver Brook Reservation, of greater interest than its small extent presupposes, Revere Beach, which is open to public use for several miles, and improvements along the Charles, Mystic, and Neponset rivers.

EDUCATION, LIBRARIES, ETC. Boston is noted as one of the greatest educational and literary centres of the country. Its public-school system comprises, besides kindergarten, primary, and grammar schools, a liberal number of high schools, and also normal and Latin schools. The Boston Latin School, founded in 1635, and the English High School occupy the largest school building in the United States. Among the higher institutions of learning are Boston University (Methodist Episcopal), Boston College (Roman Catholic), Massachusetts Institute of Technology, the medical and dental schools of Harvard University, Tufts College Medical School, College of Physicians and Surgeons, Saint John's Ecclesiastical Seminary (Roman Catholic), and the Massachusetts College of Pharmacy. The New England Conservatory of Music has an enviable reputation, and the Lowell School of Design, the Massachusetts Normal Art School, and the school connected with the Museum of Fine Arts are representative of Boston as a centre of art education. Besides these regular institutions, the great system of free lectures on a wide variety of subjects practically constitutes a great university. The lectures in the Old South Meeting House have been mentioned; the work of the Lowell Institute, which is specially endowed for this purpose, is also worthy of note.

The Boston Public Library maintains fifty-seven or more agencies, including several branch stations with large permanent collections, besides numerous reading-rooms and delivery and deposit stations. In the metropolitan district there are some 30 free libraries, with a total of 1,300,000 volumes, while the collections open to investigators aggregate 3,000,000. Among other noted collections in the city are those of the American Academy of Arts and Sciences, the Boston Athenæum (founded in 1807, with nearly 200,000 volumes), Boston Library Society, Congregational Library, Massachusetts Historical Society (founded in 1791), Massachusetts Horticultural Society (founded in 1829), New England Historic Genealogical Society, State Library, Social Law Library, and Natural History Society, besides those of the leading educational institutions.

CHARITABLE INSTITUTIONS. In the number and efficiency of institutions of this class, both public and private, Boston holds high rank. Among these, mention may be made of the Massachusetts General Hospital, one of the best equipped in the world; Massachusetts Homeopathic Hospital, Carney Hospital (in South Boston), the City Hospital, Women's Charity Club Hospital (in Roxbury), Massachusetts Charitable Eye and Ear Infirmary, New England Hospital for Women and Children, Boston Insane Hospital (separate establishments for males and females), Children's Hospital, the Horace Mann School for Deaf Mutes, and the Perkins Institute for the Blind, which has a large library of raised-character books. On islands in the harbor are the principal almshouse, House of Correction, and House of Refuge for Boys.

THEATRES, CLUBS, SOCIETIES, HOTELS. The Boston Theatre, seating 3000, is the largest in New England, and the Colonial, Boston Museum, Tremont, Hollis Street, Park, Castle Square, Columbia, Keith's, Howard Athenæum, Bowdoin Square, and Bijou theatres have seating capacities ranging from 1000 to 2000. The Boston Museum, noteworthy for the first appearance of several famous actors, is the oldest in the city. The old Tremont Theatre, which occupied the site of the present Tremont Temple, was also known for the eminent persons who appeared on its stage. The celebrated Boston Symphony Concerts are given in Symphony Hall, one of the finest music halls in the country.

Boston is the home of a large number of historical, scientific, literary, and musical societies. In the last-mentioned class are such well-known organizations as the Apollo, Cecilia, Harvard Musical, Handel and Haydn, and Orpheus. The social and literary clubs include, among numerous others, the Somerset, Algonquin, Saint Botolph, the University, Boston Art, Union, New England Women's, Mayflower, Boston Athletic Association, Appalachian Mountain, the Temple (the oldest in the city), and the Country Club, at Clyde Park, Brookline.

The principal hotels include the Adams House, the Parker House, Young's Hotel, the Hotel Touraine, the Somerset, the Lenox, and the Essex.

COMMERCE AND INDUSTRY. Boston is the terminus of the Boston and Albany, the Boston and Maine, the Fitchburg, and the New England railroads, the Old Colony System of the New York, New Haven and Hartford Railroad, and the Boston, Revere Beach and Lynn (narrow-gauge) Railroad. There are two large union stations on the water-fronts and on opposite sides of the business district; the northern used by the Boston and Maine and the Fitchburg railroads, and the southern, one of the largest stations in the world, over 800 feet long by 700 feet wide, used by the Boston and Albany and the New York, New Haven and Hartford railroads. There are several regular steamship lines to Europe. The harbor is spacious and safe. It is about 8 miles wide and more than twice as long, with a minimum depth in the main channel of 23 feet at low tide. There are several lights and beacons, and numerous islands, upon certain of which are situated the old Fort Independence and Forts Warren and Winthrop, besides the charitable and reformatory institutions already mentioned.

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BOSTON

TRINITY CHURCH (UPPER)

THE NEW STATE HOUSE (LOWER)

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Boston's interests are commercial rather than industrial, the factories owned by Boston capital being mostly out of town; the manufactures, however, are extensive and varied. According to the census of 1900, a total of nearly $145,000,000 was invested in the various manufacturing industries, which had a production valued at over $205,000,000. The city is the second wool market in the world, ranking next to London, and is second to New York only among American ports in the value of its foreign trade, which amounts to about $200,000,000 annually. The exports, which represent five-eighths of the total, comprise provisions (including animals), breadstuffs, cotton and its manufactures, leather and its manufactures, iron and steel manufactures (the above-named classes constituting 90 per cent. of the whole amount), wood and its manufactures, and distilled spirits. The principal imports are wool and woolen manufactures, fibres, sugar, hides and skins, cotton and cotton manufactures, chemicals, manufactures of iron and steel, leather and manufactures of leather, wood and wooden products, fruits, fish, and paper-stock. The facilities for handling this great traffic are excellent; a system of freight terminals brings together the railroads and ships, deep-water terminals making accessible docking facilities for the largest vessels. In 1900 the internal revenue collections at Boston were about $8,000,000, and the post-office receipts $3,200,000. The fishing industry, which formerly was one of the chief sources of Boston's prosperity, is still of importance, the value of its products amounting annually to more than $500,000. Boston is the centre of immense mining, railroad, and insurance interests, which are operated all over the country, particularly in the West.

Administration, Municipal Activities. The government is vested in a mayor, elected every two years, a bicameral city council composed of 13 aldermen and 75 councilmen, and subordinate administrative officials, of whom the city clerk and street commissioners are chosen by popular vote, the city messenger and clerk of committees elected by the council, the police board appointed by the State Governor and council, and all others appointed by the mayor, a number of the appointments, however, being made subject to the consent of the upper house of the municipal council. A prominent feature of the municipal government is the large number of public-spirited citizens who administer, without remuneration, important departments; among these may be mentioned the trustees of the Public Library, trustees of the City Hospital, overseers of the poor, Park Commission, boards governing the institutions for paupers, children, and insane; also the Board of Municipal Statistics, which published weekly, until 1900, the *City Record*, an official gazette.

There has been of recent years a great increase in the activities undertaken by the municipality, which is one of the most progressive in the United States. These now extend to a municipal printing plant, work in the repair and construction of city buildings, watering of the streets, municipal bath-houses, lectures and concerts, free excursions for children, a camp for boys, etc. Besides these, and the greatest of municipal enterprises, the new subway, there are the combined municipal works comprised in the metropolitan systems of parks (already mentioned), of sewerage, and of water supply. The metropolitan districts are not, however, coextensive. The sewerage system comprises a network of mains (550 miles in Boston) which discharge into deep water in Boston Bay. The water-supply is obtained from the Nashua River, each municipality controlling its distributing system; and the plan is arranged to include other sources in case the demand exceeds the capacity of the present source. Boston, since the completion of the first works in 1848, has had an efficient system of water-works, which has cost about $23,000,000, and includes 715 miles of mains.

The new subway, constructed in 1895-98 at a cost of $4,350,000, was the first example in the United States of municipal enterprise in this field—a notable work of engineering undertaken for the relief of the congested traffic in the business district and to afford rapid communication with the suburbs of the south and west. It was partly opened for traffic in 1897, when it was leased for operation to a private company for a term of 20 years. The subway is substantially constructed, is well lighted and ventilated, and is attractively finished at the stations with glazed white brick. Its immediate success has led to an extension of the system to the suburban districts on the east. With the facilities afforded by the subway, the Boston transit system has attained a high degree of efficiency; the elevated and electric roads supplement each other, and connect also with the steam-railway terminals. The elevated road system, opened in 1901, extends through the city, from Roxbury to Charlestown, and is connected with each end of the subway. The structure is of steel and the trains are operated by electricity.

The annual expenditures of the city for maintenance and operation amount to about $20,000,000 (including $1,500,000 by the county), the main items of expense being about $3,000,000 for schools, $2,000,000 for interest on debt, $1,750,000 for the police department, $1,500,000 for street expenditures (other than street cleaning and sprinkling, which amount to $500,000), $1,250,000 for the water-works, $1,250,000 for the fire department, $1,200,000 for charitable institutions, $750,000 for municipal lighting, over $600,000 for garbage removal, and about $500,000 for parks and gardens. The assessed valuation of property, real and personal (the basis of assessment being 100 per cent.), is about $1,130,000,000; the bonded debt is, approximately, $82,000,000, including $3,500,000 county bonds. The legal borrowing limit is fixed at 2½ per cent. of the average assessed valuation for three years.

Population. From the earliest date of the country's history, Boston has ranked among the largest American cities. The growth of its population has been gradual and steady, as seen from the following figures: 1790, 18,320; 1800, 24,937; 1850, 136,881; 1870, 250,526; 1890, 448,477; 1900, 560,892. As in nearly all large modern cities, two interesting facts may be noted in connection with the distribution of the population in Boston—the segregation of various classes in certain localities, and the gradual shifting of the quarters of the various classes following in the wake of industrial changes.

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The first section to be settled in Boston was the northern end of the peninsula. Until the middle of the Nineteenth Century the population was still largely confined to the peninsula. After that period the population began to spread out into Charlestown, East Boston, South Boston, and of late years has turned to Roxbury, West Roxbury, Dorchester, and Brighton. Boston proper contains now less than a third of the total population, business buildings crowding out dwellings. What was once the most fashionable quarter—the North End—has become the business section of the city, and is partly taken up with the dwellings of the poorer, largely immigrant people. The fashionable quarters first moved to the South End, and, after being crowded out once more by business interests, have become located in the Back Bay section.

While it is claimed for Boston that it still retains its old American spirit and character, the city has a larger foreign element than many other large American cities. The percentage of people of foreign birth in 1890 was 35.27, and those of foreign parentage constituted 60.9; while in 1900 the former constituted 35 per cent. of the total population. Of the foreign nationalities, the Irish are most strongly represented. The largest immigration of Irish took place in the decade 1845-55, the immigrants settling in the once fashionable section of the North End. The Scotch, English, and Germans are represented in much smaller numbers, while lately the immigration has been made up largely of Italians and Russian Jews, the latter having taken the place of the Irish in the North End of the city. The colored population is very small, having been less than 12,000 in 1900. The geographical conditions, unlike those of New York, have allowed of an easy expansion of the city limits, thus preventing excessive overcrowding. However, the North and South ends have a congested population huddled largely in tenements.

History. The peninsula on which old Boston was built was known as Shawmut, or Sweet Waters, to the Indians, and was named Trimontaine by the early colonists, from the three-peaked top of one of its hills. It was first visited by an exploring party from Plymouth in 1621. In July, 1630, the colonists brought by John Winthrop to Salem established themselves at Charlestown; but on the invitation of William Blackstone, or Blaxton, a 'bookish recluse,' who had lived on the peninsula since 1626, Winthrop and the greater part of his company moved to Trimontaine on or before September 17, 1630, when the place was renamed Boston, after the Lincolnshire town whence many of the colonists had come. The old 'Trimontaine,' changed to Tremont, is preserved in Tremont Street and several buildings. Early in 1632 the first meeting-house was erected, at the head of the present State Street, and three years later the first free schoolhouse was built on the present School Street. In 1635 the first grand jury of the country met in Boston. Boston soon became the chief town of the Massachusetts Bay Colony, and the centre of Puritan religious life and learning. In 1636 the Antinomian controversy (see Hutchinson, Anne) broke out, and, with the disturbances caused by Roger Williams (q.v.), led to the emigration of many prominent citizens. Between 1648 and 1688 four women—Margaret Jones, of Charlestown; Mary Parsons, of Springfield; Ann Hibbins, and Goody Glover—were executed for witchcraft; and between 1659 and 1661, during the excitement caused by the Quaker immigration, four Quakers were hanged on the Common for returning after banishment on pain of death. A post-office was opened in 1649. Two years later a mint was established, at which the 'pine-tree' shillings were coined for many years. A printing-office was opened in 1674, and in 1704 the *Boston News Letter*, the first regular newspaper to be printed in America, began publication. At the beginning of the Eighteenth Century Boston was the largest and most important town in America, and its citizens took a leading part in the expression of public opinion in the conflict of the colonies with Great Britain. The impressment of seamen by the home Government in 1747 caused several riots, and the spirit of independence increased till the Stamp Act in 1765, and later the revenue acts, incited riots, which led to the quartering of two British regiments in Boston. On March 5, 1770, the 'Boston Massacre' (q.v.) occurred. On December 16, 1773, occurred the famous Boston Tea Party which caused Parliament to pass the Boston Port Bill (q.v.)—in effect June 1, 1774—virtually closing the Boston Harbor to commerce. At the outbreak of the Revolution, Boston was occupied by British troops, but was besieged by the American Army after the skirmish at Lexington, and attempts to fortify Charlestown were followed by the battle of Bunker Hill (q.v.), June 17, 1775. By fortifying Dorchester Heights, Washington forced the British to evacuate the town, March 17, 1776.

Since the Revolution Boston's prosperity has been almost continuous, the most important interruption having been caused by the Embargo of 1807. The city received its charter in 1822, and had then a population of 47,000. In 1840 the *Britannia*, the first of the Cunard liners, entered Boston harbor and began the present system of transatlantic passenger traffic. In 1849 there was an epidemic of cholera, 5080 dying out of a population of 130,000. Slaves were owned in Boston as early as 1635, and continued to be held till after the Revolution. In 1831 William Lloyd Garrison began the publication of *The Liberator*, and organized (1832) the New England Anti-Slavery Society, the first society to advocate immediate emancipation. Boston thus became the centre of the radical Abolitionist movement, though in 1835 there was an Anti-Abolitionist riot. Intense excitement was caused throughout the country by the rescue here of Shadrach, in February, 1851, and the return to slavery from here, under the provisions of the Fugitive Slave Law of 1850, of Thomas M. Sims (q.v.), in April, 1851, and of Anthony Burns (q.v.), in May, 1854. During the Civil War Boston strongly supported the measures of the Federal Government, and sent more than 26,000 men to join the army and navy. The city has suffered severely from fires, the most destructive occurring in 1676, 1679, 1711, 1760, 1872, 1889, and 1893. That of 1872 was especially disastrous, 50 acres in the business portion of the city having been thoroughly devastated, and property valued at over $75,000,000 destroyed. On September 17, 1880, the two hundred and fiftieth anniversary of the settlement of Boston was celebrated with great enthusiasm.

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BOSTON

THE OLD STATE HOUSE (UPPER)

FANEUIL HALL (LOWER)

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UNIV. OF MICH.

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Consult: Dr. Winsor's exhaustive and scholarly *Memorial History of Boston, Including Suffolk County*, 4 vols. (Boston, 1880-81); also Quincy, *A Municipal History of the Town and City of Boston, from 1630 to 1830* (Boston, 1852); Hale, *Historic Boston and Its Neighborhood* (New York, 1898); Drake, *History and Antiquities of Boston, from 1630 to 1670* (Boston, 1854); Drake, *Old Landmarks and Historic Personages of Boston* (Boston, 1900); and Lodge, "Boston," in the *Historic Towns Series* (London, 1891); Sprague, *Government of Boston; Its Rise and Development* (Boston, 1890); *Directory of the Charitable and Beneficent Organizations of Boston* (Boston, 1899); "The Completion of the Boston Subway and New Arrangements of Street Cars," in *Railroad Gazette*, No. XXX. (New York, 1898).

BOSTON, THOMAS (1677-1732). A Scottish divine and author, born at Dunse (Berwickshire). He was educated at the University of Edinburgh (M.A., 1694), and in 1699 was ordained to the Presbyterian ministry and appointed to the parish of Simprin. In 1701 he was clerk of synod, and in 1707 became pastor of Ettrick (Selkirkshire). It was through his reading and recommendation to friends of the treatise *The Marrow of Modern Divinity* that the well-known Marrow controversy (q.v.) was instituted. He wrote *Human Nature in its Fourfold State* (1720), a strongly Calvinistic work, frequently reprinted, and a popular sermon styled *The Crook in the Lot* (1863). Consult: His *Memoirs* (1776) and the *Whole Works* (ed. by S. McMillan, London, 1854).

BOSTON ART SCHOOL. This school, organized in 1876, is the most important school of design in Boston. The course includes drawing and painting from life and casts, anatomy, modeling, and perspective. The student has also the benefit of the Museum for copying purposes. There are two valuable scholarships—the Paige traveling scholarship for two years, and the Longfellow traveling scholarship for three years. Besides these there are ten scholarships of free tuition awarded each year. The annual prizes are the Sears prizes of $50 each for a drawing from a cast, the nude, and a portrait in oils; and the Thayer prize of $150, in three parts of fifty dollars each, for work in decorative design. The fee is from $90 to $125 for three terms.

BOSTON COLLEGE. A Roman Catholic institution under the direction of the Fathers of the Society of Jesus. It was chartered in 1863, and opened in Boston, Mass. There are fifteen founded scholarships; the value of the buildings and grounds is placed at $537,800; and the annual income from tuition fees at $16,000. The college faculty in 1901 numbered 19 and the students 205; at the same time the number of students in the allied preparatory school was 247. The library contains 43,000 volumes. The college course is four years, leading to the degree of A.B.

BOSTONIANS, THE. A novel by Henry James (1886).

BOSTON MASSACRE, THE. After the quartering of British troops in Boston (1768), there was continual friction between the soldiery and the people. Several minor riots occurred early in 1770, and the trouble culminated on March 5, when seven soldiers under Captain Preston, who were being pelted with snowballs and stones by fifty or sixty of the populace, headed by one Crispus Attucks (q.v.), fired into the crowd, killing three and wounding seven more, of whom two died. This act infuriated the Boston people, who met in mass-meeting and compelled the withdrawal to Castle Island (March 12) of the two regiments of troops. The seven soldiers, with Captain Preston, were tried for murder in October and November, were defended by John Adams and Josiah Quincy, and were finally acquitted, though two of them were declared guilty of manslaughter and received light punishments. There is much difference of opinion with respect to the 'Massacre,' some writers regarding it as a lawless affair discreditable to the people and the soldiers alike and without any great historical significance; others, as the "first act in the drama of the Revolution." In 1816 John Adams wrote: "Not the Battle of Lexington or Bunker Hill, not the surrender of Burgoyne or Cornwallis, were more important events in American history than the battle of King Street on the 5th of March, 1770." The day was annually commemorated in Boston until 1783, and in 1888 a monument was erected to the memory of the ten victims. Consult: Kidder, *History of the Boston Massacre* (Albany, 1870); and Winsor, *Memorial History of Boston*, Vol. III. (Boston, 1880-81).

BOSTON PORT BILL. A bill passed by the British Parliament, and signed by the King in March, 1774, to punish the people of Boston for their destruction of tea in Boston Harbor, December 16, 1773. (See BOSTON.) It was to go into effect on June 1 and provided for the virtual closure of Boston Harbor to commerce, for the removal of the seat of government to Salem, and for the supplanting of Boston by Marblehead as a port of entry, until the people of Boston should indemnify the owners of the property destroyed and fulfill other specified conditions. This, the greatest encroachment yet made by Parliament upon the liberties of the colonists, aroused an instant and wide-spread feeling of indignation and alarm. Assurances of sympathy and support were immediately sent to the people of Boston by the legislatures and committees of correspondence of other Colonies, and by many town meetings, and June 1 was widely observed as a day of fasting and prayer, bells being tolled, flags placed at half-mast, and houses draped in mourning. Material aid was also given from all quarters, food-supplies being sent from as far as South Carolina. Non-importation agreements were everywhere urged, pamphlets and broadsides were issued, and finally a general congress —the first Continental Congress—was called to discuss this and other obnoxious acts passed in the same year, and to devise measures for relief. Consult Frothingham, *Rise of the Republic* (Boston, 1872); and, for text of the bill, Pickering, *Statutes at Large*, Vol. XXX. (London, 1842).

BOSTON SYMPHONY ORCHESTRA. One of the finest orchestras in the United States. Ever since the beginning of the Nineteenth Century, the works of the great instrumental masters had been performed by amateur orchestras. In 1881 Mr. Henry L. Higginson established a per-

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manent orchestra, which was to give a series of 24 subscription concerts on Saturday nights throughout the season. Each concert is preceded by a public rehearsal on Friday afternoon. Originally, the orchestra consisted of 67 pieces. The first conductor was Georg Henschel. He was succeeded by Wilhelm Gericke, who soon made his orchestra the equal of any body of performers in Europe. Arthur Nikisch kept the orchestra at its high degree of technical excellence, and infused his wonderful personality into interpretation of the works of the great classical masters. His successor, Emil Paur, was a conductor of wonderful temperament, with strong leaning toward the Neo-German School, whose works figured extensively on his programmes. He, in turn, was again succeeded by Wilhelm Gericke, the present conductor, who is of the academic type. After 1890 the Boston Symphony Orchestra regularly visited New York, where they gave five concerts on Thursday nights. A new feature was the establishment, in 1900, of afternoon concerts on Wednesdays in New York. These were not public rehearsals, in so much as different programmes with different soloists were performed on Wednesdays and Thursdays. At present the orchestra numbers about 80 performers. Rehearsals are held daily during the season. This, and the fact that the organization plays only at concert performances, are the principal reasons of the high perfection that marks the playing of this orchestra. The conductor is now always appointed for five years. Franz Kneisel, the concert-master, organized from among the members of this orchestra his famous quartet, which is not surpassed by any kindred organization in the world.

BOSTON TEA-PARTY, THE. A popular designation of the summary action of a party of Bostonians, on December 16, 1773. After an unavailing protest against the importation of tea as part of the policy of taxing the Colonies without representation in Parliament, a number of citizens, in Indian disguise, proceeded to three ships carrying cargoes of tea, and threw about 350 chests of tea into the harbor. In retaliation for this action, the port was declared closed.

BOSTON UNIVERSITY. A system of allied schools and colleges. The university is situated in Boston, Mass., and was chartered by the Massachusetts Legislature in 1869, the original corporators being Isaac Rich, Lee Claflin, and Jacob Sleeper. The university is divided educationally into (1) a College of Liberal Arts (1873), and a College of Agriculture (Massachusetts Agricultural College, situated at Amherst, Mass., 1875), neither of which requires a collegiate training for matriculation; (2) a School of Theology (1871), a School of Law (1872), and a School of Medicine (1873), admission to all of which is conditional upon a collegiate education; and (3) a general post-graduate department, conferring the higher degrees in the various branches of the arts and sciences, and known as the School of All Sciences. By special arrangement with the National University of Athens and the Royal University of Rome, students in the School of All Sciences may study without expense in those universities, the work done there being counted toward a degree from Boston University. The administration of the university is vested in a university council, consisting of the president of the university and the deans of the constituent schools; a university senate, consisting of the council and the professors of the several faculties; and a corporation, composed of trustees, not less than 10 in number nor more than 30, elected for a term of five years each. The chief benefactor of the university is Isaac Rich, in whose honor the institution founded 64 free scholarships; since then the university has founded over 200 other scholarships as well as two fellowships. The property held by the institution is valued at $1,500,000. The number of instructors in 1900 was 114, and the number of students, 1430.

BOS'TRA. See BOZRAH.

BOSTRÖM, bōs'trēm, CHRISTOFFER JACOB (1797-1866). A Swedish philosopher. He was born at Piteå and studied at the University of Upsala. In 1838 he was appointed an adjunct professor of philosophy at the university, and from 1842 to 1863 held the chair of practical philosophy. He wrote little, but his system has been very influential in Sweden, where it is still the most prominent in centres of higher education. He has been termed by Falckenberg (*History of Modern Philosophy*, Armstrong's trans.) "the most important systematic thinker of his country." His teaching, defined by himself as 'rational idealism,' presents reality as spiritual only, and God as an absolute, self-conscious unity, in which all living beings, according to degree, are forever immutably contained. Each living being is a thought of God, and as such potentially emancipated from space and time. Yet man belongs also to a sensible world, which exists for him until he rises beyond the limited to the real, and becomes for himself that which he is in God. Boströmian ethics, recalling that of Krause, makes society, as well as the individual, a thought of God; holds constitutional monarchy to be the sole reasonable form of state; and regards an all-comprehensive system of states as the ultimate ideal of political development. Boström's writings have been edited by Edfeldt (Upsala, 1883). Consult Höffding, "Die Philosophie in Schweden," in the *Philosophische Monatshefte*, Vol. XV. (Berlin, 1879).

BOSWELL, bōz'wĕl, JAMES (1740-95). An English lawyer and writer celebrated as the biographer of Dr. Samuel Johnson. He was born October 29, 1740, in Edinburgh, where his father, who had the title of Lord Auchinleck, from the name of his property in Ayrshire, was one of the judges of the Court of Sessions. He was intended by his father for the law. He studied first in Edinburgh and Glasgow, and afterwards at the University of Utrecht, where he went in 1763. When in London in that year, May 16, he made the acquaintance of Johnson, an event of decisive importance for his whole subsequent life. The acquaintance was earnestly sought by himself, and originated in his ardent admiration of Johnson's writings. He spent one winter in Utrecht, and then proceeded on a tour through Germany, Switzerland, and Italy, and visited Corsica with a letter of introduction from Rousseau to Paoli, with whom he contracted a warm and lasting friendship. He enthusiastically adopted the cause of Corsican independence; and after his return to Scotland, published his *Account of Corsica* (1768), which was speedily translated into sev-

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eral languages. Boswell became a member of the Faculty of Advocates in 1766, but never devoted himself with earnestness to the law. In 1773 he was admitted into the Literary Club, instituted by Johnson, of which Burke, Goldsmith, Reynolds, and Garrick were members. From this time he made it his principal business to note down the sayings and doings of Johnson, with whom he associated on most intimate terms, and whom he accompanied on his tour to Scotland and the Hebrides in 1773. It has been estimated that, taken all together, Boswell met Johnson on 276 days. Boswell was married in 1769 to his cousin, Margaret Montgomerie, by whom he had several children. After Johnson's death, in 1784, he employed himself in arranging the materials which he had collected for his long-contemplated biography. His *Journal of a Tour to the Hebrides* appeared in 1785; his *Life of Samuel Johnson*, 2 vols., in 1791. Both have gone through many editions. Boswell has been emphatically styled by Macaulay 'the first of biographers.' His work is indeed full of details, and these are such as exhibit character, and are arranged in the most interesting manner. He conceals neither his own faults nor those of Johnson, but presents a picture of which the truthfulness is too vivid to be questioned: and Johnson is, unquestionably, better known by the pages of Boswell than by any of his own writings. Boswell died in London, May 19, 1795. Besides the works already mentioned, he was the author of several productions of great interest to the curious. In 1857 appeared a posthumous volume of *Letters of James Boswell, addressed to the Rev. W. J. Temple, from the Original MSS.*, in which the gay, *insouciant* character of the man very strongly appears. The sketches of Boswell by Macaulay and Carlyle are famous. Consult: Rogers, *Boswelliana* (London, 1874); and Fitzgerald, *Life* (London, 1891). For the best edition of *The Life of Johnson*, consult Hill (Oxford, 1887).

BOSWELLIA, bŏz-wĕl'lĭ-â (named after Dr. John Boswell). A genus of trees of the natural order Burseraceæ. Few species are known, of which the most interesting is *Boswellia serrata*, the tree which yields olibanum (q.v.), now very generally believed to have been the frankincense (q.v.) of the ancients. It is a large timber-tree, with pinnate leaves, which have about ten pairs of hairy serrated oblong leaflets, and an odd one, each leaflet about one to one and a half inches in length. The flowers are small and numerous, in axillary racemes, and of a pale-pink color. When the bark is wounded, the olibanum, of a delightful fragrance, flows out, and hardens by exposure to the atmosphere. The tree is found in the mountainous parts of Coromandel, and is supposed to be also a native of other parts of India, and of Persia, Arabia, and perhaps Abyssinia. A very similar species, a native of India, also yields a resin, comparatively coarse, which is used as a substitute for pitch. *Boswellia papyrifera* is indigenous in parts of Africa, extensive forests of this species being reported in the mountains of Morocco. *Boswellia Carteri* is also common in Africa and yields large quantities of olibanum.

BOSWORTH, bŏz'wŭrth, or MARKET BOSWORTH (AS. *Bosan*, Bosa's + *worth*, farm). A small market town of Leicestershire, England, famous for the moor, two miles to the south, where the battle of Bosworth Field was fought (August 22, 1485). In this battle, which terminated the Wars of the Roses, Richard III. was slain, and on a near elevation called Crownhill Lord Stanley placed the crown on the head of the Earl of Richmond as Henry VII.

BOSWORTH, FRANCKE HUNTINGTON (1843—). An American physician, born at Marietta, Ohio. He studied at Yale, and at the Bellevue Hospital Medical College, where he subsequently became professor of diseases of the throat. He was also appointed consulting physician to the Presbyterian and Saint Vincent's hospitals, New York. His publications include a *Treatise on Diseases of the Nose and Throat* (1893), and a *Text-Book of Diseases of the Nose and Throat* (1896).

BOSWORTH, JOSEPH (1789-1876). An English philologist. He was born in Derbyshire. He graduated at Aberdeen and also took degrees from Oxford and Cambridge. In 1817 he obtained the vicarage of Horwood Parva, Buckinghamshire. He devoted such time as an active discharge of his parochial duties left at his disposal to literature, and especially to researches in Anglo-Saxon. The result of his labors appeared in 1823 in *Elements of Anglo-Saxon Grammar*. Fifteen years later he published the work by which his name is best known: *A Dictionary of the Anglo-Saxon Language* (new edition, very much enlarged and improved by T. N. Toller, 1882-98). Bosworth lived in Holland from 1829 to 1840 as British chaplain, and during this period he translated the Book of Common Prayer into Dutch. On his return to England he was presented to the vicarage of Waith, in Lincolnshire. In 1857 he became rector of Water Shelford, in Buckinghamshire, and in the following year Rawlinson professor of Anglo-Saxon at Oxford. In 1865 he published the Gospels in Gothic and Anglo-Saxon, in parallel columns with Wyclif's version of 1389, and Tyndale's of 1526. In 1867 he established a professorship of Anglo-Saxon at the University of Cambridge. He died May 27, 1876.

BÖSZÖRMÉNY, bē'sĕr-mā-ny' (cf. Russ. *basurman*, Mussulman, Hung. *hajdu*, Turk. *haiduk*, a light-armed Turkish or Hungarian guard), or HAJDU-BÖSZÖRMÉNY. A town of the Kingdom of Hungary, about 10 miles north-northwest of Debreczin (Map: Hungary, G 3). It is situated in the midst of a fertile district. Vegetables and fruit, particularly melons, are raised in large quantities. Population, in 1890, 21,000; in 1900, 25,065. (The population is given for the municipal district, which includes five villages besides Böszörmény.)

BOT, BOTFLY (cf. Gael. *botus*, belly-worm). Names common to several dipterous insects of the family Œstridæ, which are parasitic in their early stages upon or within certain domestic and wild animals.

The HORSE-BOT, or bot-fly of the horse (*Gastrophilus equi*, Fab.), is a creature well known to stockmen and veterinary surgeons. The adult fly is about three-quarters of an inch in length; the body is very hairy and brown in color. The female has an extensile abdomen. She poises herself in flight near a horse, then darts suddenly toward the animal, gluing an egg to a hair almost instantly, then retreating for a yard or two until another egg is ready to be deposited.

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In this way hundreds of eggs may be deposited upon a horse in a short time. The larvæ, or maggots, soon form within the eggs, but these do not hatch unless the horse licks itself, in which case the eggs are carried to the alimentary canal, hatch almost immediately, and the larvæ enter the stomach, where they attach themselves to its wall and remain until fully grown. The inner stomach-wall of a horse is frequently covered with large patches of these larvæ densely crowded together. This attachment to the walls of the stomach probably causes an irritation which interferes with the normal action of the glands, or reduces the glandular surface; the grubs also probably extract some nutriment from the walls of the stomach. There can be little doubt that the presence of these grubs is injurious to the horse, although some stock-raisers consider this injury insignificant. When fully grown the larvæ loose their hold and pass through the pyloric orifice of the stomach and down through the intestines, occasionally attaching themselves to the intestinal wall or to the wall of the rectum, causing irritation which is sometimes severe. They are finally voided with the excrement, transformed to pupæ near the surface of the ground, and eventually the adult flies appear. There seems to be but one generation annually. Horses kept in stables are little troubled if they are well groomed. In pastures or on ranges, however, unless the stock is washed every two or three weeks, bots are apt to be present. Turpentine, used with care, is considered a remedy for those which succeed in establishing themselves in the stomach.

The Ox-Bot, ox-warble, ox-wormal, or heel-fly, as it is termed in the West (sometimes simply 'the grub'), belongs to a different genus of Œstridæ and has quite different habits. The American species is *Hypoderma lineata*, Villers, and the European species is *Hypoderma bovis*, L. The 'grubs' of this species are found in lumps or pockets in the skin of cattle and it was formerly supposed that the fly laid its eggs upon the hairs and that the larvæ worked their way through the skin, forming cysts in which they remained through the entire larval life, but it has recently been discovered that the life of the species is more complicated. The flies appear early in the spring and attach their eggs to the hairs, particularly of the legs, of cattle, and especially the part just above the hoof, whence comes the name 'heel-fly.' The eggs, or the quickly hatching larvæ, are carried into the mouth of the animal when it licks its legs, and the larva penetrates the walls of the œsophagus by means of its strong spines. After penetrating the œsophagus it casts its skin and becomes nearly smooth, and for several months works through the connective tissue between the skin and the flesh, penetrating gradually down the neck and ultimately reaching a point beneath the skin in the region of the back. In the meantime, all traces of inflammation have disappeared from the œsophagus. When the final position is reached the grub molts again, becomes more spiny, and bores a hole through the skin through which it gets air for breathing. Its presence causes much irritation, and it feeds upon the pus and bloody serum which collect. Several individuals usually join together in one of these punctures or sores. When fully grown it forces its way through the skin, drops to the ground, where it transforms to a pupa, and the following spring the adult fly emerges. The adult looks much like the common honey-bee. It is about half an inch long, black in color, and is clothed with reddish-brown hairs. An oily application to the wound will kill the grubs, and some simple antiseptic, like carbolic acid, causes a rapid healing. When the insects are common, however, cattle become emaciated and their skins are spoiled for commercial purposes by the perforations. The money lost in the United States through the work of this insect is very great.

The Sheep-Bot (*Œstrus ovis*, L.) belongs to still another genus of Œstridæ and differs again radically in habits. The adult flies are smaller than those of the other species mentioned and resemble large house-flies. The color of the head and thorax is dull yellow, but so spotted with brown as to appear brownish. The abdomen is velvety and variegated with dark brown and straw-color. The female fly lays her eggs in the noses of sheep. They hatch almost immediately, and the larvæ at once commence to work their way up the nostrils and the nasal passages, causing great irritation, until they reach the frontal sinuses, which are cavities located between the two plates of the skull, and lying one on each side of the central line of the head and between and a little above the eyes. Here they attach themselves to the membranes which line the sinuses, and feed upon the mucus. The damage caused by this insect has probably been underestimated. Stiles has found that in Colorado, in some large flocks, at least 25 per cent. of the animals are affected; and after conducting a number of post-mortems he is convinced that in many cases the bots cause the death of the animal. It is the custom in some places to prepare 'salt logs' for the sheep to visit. The salt is placed in cavities in the log and the edges of the cavity are smeared with tar, so that the sheep in eating the salt gets a certain amount of tar upon its nose. This is supposed to deter the flies from laying their eggs. A recent remedy proposed by Stiles consists in puncturing the frontal sinuses with a trochar and syringing in a small quantity of gasoline.

Other bot-flies affect domestic animals and in tropical regions even man himself. The *Œstrus hominus* of Linnæus and the *Dermatobia noxialis* of Goudot, in Guiana, Mexico, and other tropical regions, lay their eggs upon the skin of monkeys and of human beings, and the larvæ form cysts under the skin, much like those of the ox-bot. The emasculating bot-fly (*Cuterebra emasculator*, Fitch) lives in the larval state in the inguinal and axillary regions (testicles) of squirrels and gophers. The rabbit bot-fly (*Cuterebra cuniculi*, Clark) in the larval stage forms a large tumor in the skin of the common rabbit. Other species affect reindeer in Europe, and deer, elk, and antelopes in America. The history of many American species, with illustrations, may be found in Osborn's *Insects Affecting Domestic Animals* (Bulletin No. 5, n.s., Div. of Entomology, U. S. Dept. Agri., Washington, 1896), which also contains an extensive bibliography of the Œstridæ.

BOTANIC GARDEN (Gk. βοτανικός, *botanikos*, pertaining to herbs, plants; see Botany). An area upon which is grown a collection of plants primarily for scientific purposes. In such a collection the idea may be to include as

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many forms of vegetation as can grow in the conditions of the garden; it may be to illustrate some special phase of botany, as natural relationships, ecology, economic botany, etc.; or it may be to furnish material for instruction and research. The Benedictine monks of Italy are said to have established the first botanic gardens in the Ninth Century, but they were designed entirely for growing the various medicinal plants. It was not until the latter part of the Sixteenth Century that plants began to be collected into gardens for scientific purposes. Since that time the botanic garden has been a growing factor in connection with research work, until now a college or university does not seem properly equipped without the facilities of such a garden.

The "Jardin des Plantes" of Paris, established in 1633, probably contains the largest collection of living plants, the catalogue enumerating 15,000 species. One of the most famous gardens is the Royal Garden of Kew, near London, which has its branches in every English colony. It lays stress primarily upon the economic value of plants, the stations in the numerous colonies being almost entirely engaged in testing the economic qualities of plants. In addition to serving this purpose, the garden is a great pleasure-park; and its herbarium and library make it one of the great centres of work in systematic botany. The botanic garden which is most favorably situated and best equipped for scientific research is that of Buitenzorg, Java, established by the Government of Holland in 1817. Its original purpose was to test the economic value of plants for the East Indian colonies, but its rare contact with tropical vegetation and the scientific spirit of its director have made it a great centre of research. Notable and very old European gardens are those of Bologna, Leyden, Montpellier, Giessen, Strassburg, Jena, and Upsala. In Germany the botanic garden is an essential adjunct of the botanical institutes, and in such conditions the most notable advances in botanical knowledge have been made. Conspicuous among those gardens, with their botanical institutes, which are prominently identified with botanical progress, are those of Munich, Würzburg, Tübingen, Göttingen, and Leipzig.

In the United States a few botanic gardens are in the process of development, but their importance has never been appreciated by those who are able to establish them. That they are necessary adjuncts to any university which professes to do research work is an idea which has never taken any hold upon boards of management. The few gardens which have been started in the United States, and which bid fair to get beyond the initial stage of elementary instruction, are as follows: the Missouri Botanical Garden (the old "Shaw Gardens") at Saint Louis, in connection with Washington University; the Botanical Garden at Cambridge, in connection with Harvard University, where, upon an area of seven acres, there are about 5000 growing plants; the Arnold Arboretum at Brookline, a public park of Boston, also in connection with Harvard University, and devoted entirely to hardy trees and shrubs; and the New York Botanical Garden, the most recent and one of the most promising of garden establishments, occupying an area of 250 acres in Bronx Park, New York City.

BOTANIC SOCIETY, ROYAL. This society, incorporated in London in 1839, organized the Botanical Gardens in London, and has established a school of practical gardening, which annually distributes thousands of cut specimens among the various schools and colleges. The society holds exhibitions in the spring and fall. The Duke of Teck is president, and the library and office are at Inner Circle, Regent's Park, N. W. The society has issued a *Quarterly Record* since 1880. For other English botanical societies, see HORTICULTURAL SOCIETY, ROYAL.

BOTANICAL GEOGRAPHY. See DISTRIBUTION OF PLANTS.

BOTANICAL SOCIETY OF AMERICA. A national scientific association organized in 1893 as an outgrowth of the Botanical Club of the American Association for the Advancement of Science. The membership includes many of the best-known botanists of the country.

BOTANY (Gk. *βοτανία*, *botania*, or *βοτάνη*, *botanē*, grass, plant). The science which treats of plants.

HISTORY. The history of the scientific study of plants probably begins with their classification by Aristotle and Theophrastus into trees, shrubs, and herbs. The study was, however, scarcely carried any further until in the Sixteenth Century the authors of the oldest herbals, Brunfels, Fuchs, Bock, and others, made a beginning again of the scientific examination of plants. It is true that these old herbalists regarded plants chiefly as "the vehicles of medicinal virtues," and that their chief object was to discover the plants employed by the physicians of antiquity, the knowledge of which had been lost in later times. Unscientific as was the purpose, it nevertheless led straight to nature and to a description of the wild plants. As a result of this intimate contact with many plants there was a gradual perception of the truth that plants have many points of resemblance to one another, which have nothing to do with their medicinal powers or their usefulness to man. Thus the idea of natural alliances began, alliances which were distinctly felt but not technically defined.

The first period of classification may be said to have culminated in the so-called 'artificial system' of Linnæus (1735). It was by no means the intention of Linnæus and his predecessors to propose a merely artificial classification of plants, a sort of ready-reference arrangement; but in their philosophy the natural affinities are indicated by certain predetermined marks, and therefore may be arbitrarily expressed. The system of Linnæus, which was really a better expression of the system of his predecessors, had such an influence upon botanical science for a hundred years that it deserves some fuller statement. He grouped the plant kingdom into twenty-four classes, based upon the number, relative position, and union of the stamens with regard to each other, and also to the carpels. For example, his Class I. (Monandria) comprises flowers with one stamen, and up to Class X. (Decandria) the classes succeed one another by the increment of a single stamen. Class XI. (Dodecandria) lumps together flowers with eleven to nineteen stamens, Class XII. (Icosandria) includes twenty or more stamens inserted on the calyx, and Class XIII. (Polyandria) includes twenty or more stamens inserted on the receptacle. From this point on

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the basis shifts, as Class XIV. (Didynamia), stamens didynamous; Class XV. (Tetradynamia), stamens tetradynamous; Class XVI. (Monadelphia), filaments united into one bundle; Class XVII. (Diadelphia), filaments united into two bundles; Class XVIII. (Polyadelphia), filaments united into more than two bundles; Class XIX. (Syngenesia), anthers united; Class XX. (Gynandra), stamens and pistil united; Class XXI. (Monœcia), flowers staminate and pistillate, the two forms on the same plant; Class XXII. (Diœcia), flowers staminate and pistillate, the two forms on different plants; Class XXIII. (Polygamia), staminate, pistillate, and perfect flowers on the same plant; Class XXIV. (Cryptogamia), flowerless plants.

It can be seen that by this scheme flowering plants may be referred readily to different categories, but that many of the categories would not at all represent natural alliances, any more than the accident of the first letter groups words together naturally in a dictionary. During the long use of this great artificial system, a far more natural one was being developed slowly, through the work of such botanists as A. L. Jussieu (1789), A. P. de Candolle (1818-21), Stephen Endlicher (1836-40). A. T. Brongniart (1843), John Lindley (1846), Alexander Braun (1864), Bentham and Hooker (1862-1883), A. W. Eichler (1883), and A. Engler (1892—).

Classification. The general classification most in use among botanists at present, though doubtless to be modified very soon, is as follows: The plant kingdom is divided into four great fundamental groups: (1) Thallophytes (Algæ and Fungi); (2) Bryophytes (Liverworts and Mosses); (3) Pteridophytes (Ferns, Horsetails, and Club-mosses); and (4) Spermatophytes (Gymnosperms and Angiosperms). The Thallophytes, as at present constituted, doubtless represent several groups coördinate with the other great groups: and probably the gymnosperms and angiosperms are each to be regarded as worthy of first rank. In any event, the general categories have become fairly well established. The subordinate classification of angiosperms is of most general interest, as the group comprises the most conspicuous and best-known forms, the true flowering plants. The two great subdivisions are Monocotyledons (grasses, palms, lilies, orchids, etc.) and Dicotyledons (the ordinary trees, buttercups, roses, peas, heaths, mints, sunflowers, etc.). The overwhelmingly large assemblage is the Dicotyledons, which are now grouped under two heads: (1) Archichlamydeæ, with calyx or corolla lacking or of distinct parts; and (2) Sympetalæ, with corolla present and its petals more or less united.

All subordinate classification is constantly shifting, in order that it may keep step with the very rapidly accumulating body of morphological data; for Classification, or Taxonomy, as it is more technically styled, must include the last expression of our knowledge of plants.

Morphology. While from the historic standpoint taxonomy (classification) deserves first mention, probably the most fundamental subdivision of botany is Morphology, which treats of the structures of plants and their development, and upon whose data taxonomy must build. There was an older morphology which dealt merely with the forms of mature plants and their organs, and whose conception of organs was that everything about a plant could be referred to a very few categories, the favorite ones being root, stem, and leaf. Under this belief, every structure which was not evidently root, stem, or leaf was disguised, and the business of morphology was to strip off these disguises and reveal the real nature of the structure. This phase of morphology was dominated by Goethe's doctrine of metamorphosis—a doctrine which has been a serious impediment to botanical progress.

The present morphology, however, concerns itself more with the development of structures than with the mature forms, a point of view which dates at least from Hofmeister's classic researches of 1851. It is essentially an embryological subject, therefore, whose purpose is to discover from developing structures every possible suggestion as to the relationships and origin of great groups. In such study the life-history of a plant is traced from the single cell with which it starts to its mature form, and this life-history at more than one point may give suggestions of relationships. To develop a plant through all of its individual history, or to obtain all the stages in the history of some kind of plant, is a long and difficult piece of work. When this is done for the hundreds of thousands of species of plants recorded, morphology will be in a position to supply the data for a real and relatively permanent classification.

At the present stage of morphological progress, however, large problems, such as the origin of the great groups, still confront us. In a general way, morphologists may be said to agree to the following statement: The algæ represent the most primitive known forms from which the higher plants may be said to have been derived. The fungi are largely regarded as degenerate algæ, which have made a certain amount of progress, but have developed no higher groups. The algæ, therefore, represent the great ancestral group, and directly from them the liverworts seem to have arisen. The liverworts have certainly given rise to the mosses, and many claim that they have also given rise to the ferns. It certainly seems true that the ferns have come either through the liverworts or directly from the algæ. Whatever may be the origin of the ferns, they have undoubtedly given rise to the seed-plants (flowering plants). Just what seed-plants have come from what fern-plants is a matter of discussion at present, but it is probable that several lines of seed-plants have arisen from as many branches of the fern stock. For a fuller statement of the modern development of morphology, see the articles Alternation of Generations and Heterospory.

Anatomy. It was early observed that the bodies of the more complex plants consisted of layers of different constitution, but the real nature of the various structures was not determined until the great improvements made in the microscope in the latter half of the Seventeenth Century. The first observers of the anatomy of plants (q.v.) with the microscope were Robert Hooke, Malpighi, Grew, and Leuwenhoek, and their descriptions of the constitution of plant-bodies remained authoritative for over a hundred years. Although the discovery was made that plant-bodies are made up of cells of various forms, the real study of cells and their development dates from 1840, following

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the researches of Schleiden and Nägeli. From that time the science of Plant Anatomy (Phytotomy, Plant Histology) has developed enormously, until now the recognized plant-tissues are very numerous, and their origin and relation to one another in position and function are fairly well understood. Anatomy is associated on the one hand with morphology, since the tissues enter into the structure of organs; and on the other hand with physiology, since the nature of the tissues has to do directly with the various functions of the plant.

CYTOLOGY. In recent years another definite field of botanical research has been developed, which deals exclusively with the problems of the cell, and is called Cytology (q.v.). It is related to anatomy in that it deals with cells, which in their aggregation form the tissues that are the subject of anatomy. At the same time, it studies cells from the standpoint of morphology, since it is concerned with cell-organs, their origin and mutual relationships; while it also has its distinct association with physiology, inasmuch as the functions of its organs furnish the ultimate problem of the cell. It is through cytological investigation that the technique of research with the microscope has been developed so greatly. The discoveries in methods of killing material, in imbedding, sectioning, and staining, have brought to view structures which were invisible to the observers of a few years ago. The principal problems of cytology at present are the structure and activities of protoplasm, the life-history of plastids (protoplasmic organs of the cell, of which chloroplastids, the green color-bodies of leaves, are examples), the structure and function of the nucleus (an essential and permanent organ of the living cell), the reduction of chromosomes (bodies which enter into the structure of the nucleus), the origin and development of the achromatic figure (a peculiar spindle-shaped body which appears in connection with a dividing nucleus), the centrosome (a cell-organ supposed to be prominently concerned in the division of the nucleus), the cell-wall, the development of the sex-cells, fertilization, the embryo, and the problem of heredity.

PHYSIOLOGY. Nothing was known of the life of plants in the early part of the Seventeenth Century except what had been learned through agricultural and horticultural operations. It was in the latter half of the Seventeenth Century that the science of Plant Physiology (q.v.) was founded, long after the physiological significance of the different organs of the human body and of most animals was generally known. The history of the gradual discovery of the various functions of plant-organs is long and full of interest. The foundation of all physiology is the direct observation of vital phenomena, and these must be evoked or altered by experiment. It is by means of this experimentation that a definite knowledge of physiological processes has developed, until now the student of plant physiology is in possession of a vast body of facts. Vital phenomena in plants are essentially the same as in animals, but are often simpler; and hence plants frequently furnish the clues for the interpretation of the more complex activities of animals.

The important general functions of plants, which furnish the subject-matter for physiological research, are as follows: Absorption of material and of energy from the outside world; transfer of water through the plant-body, by which materials are properly distributed; transpiration, by means of which water is lost from the plant's surface; nutrition, including photosynthesis (the manufacture of carbohydrates), digestion (the conversion of foods into soluble form for transfer), and assimilation (the organization of protoplasm from food-material); secretion; respiration, by means of which energy is liberated for the activities of the body; growth; and movement, which includes irritable responses to many stimuli.

For example, in the higher plants the root is an absorbing organ for water and soluble soil substances; in the root, stem, and leaves there are certain sets of vessels along which water and food-materials travel readily; the leaves and the young stem surface are organs for the absorption and evolution of the carbon dioxide and oxygen, they also give off water by evaporation (transpiration), and are most important organs for the manufacture of carbohydrate foods. Although these various processes are distributed among the organs of a complex plant, they may all go on in a single cell of the simplest plant.

ECOLOGY. A phase of plant physiology which has recently come into prominence as an independent subject is Ecology or Œcology (q.v.), which deals with the mutual relations between plants and their environment. Certain phases of ecology, such as pollination, seed-dispersal, protection, symbiosis, have long been studied, and have been called 'plant biology'; but the subject as a whole is of very recent organization. Ecology as at present organized was first presented by Professor Warming, of Copenhagen, in 1895, and its fullest recent statement is that of Professor Schimper, in 1898. The subject is yet in a very formative state, and its formulated statements must be regarded as largely tentative. Three rather distinct lines of ecological investigation have been developed. One deals with the reactions of plants, tissues, and organs to their environment, and may be called physiologic ecology. A second line has to do with the origin, development, and life relations of the plant communities known as plant societies, and may be called physiographic ecology. The third line is a study of the great forest, grass, desert, and other formations of the globe in relation to climate, and may be called geographic ecology.

Various special subjects connected with plants are also organized into distinct fields of work. *Paleobotany* (q.v.) is a study of fossil plants, a subject which has been developing with remarkable rapidity. *Bacteriology* is the science which treats of that very peculiar group of plants known as bacteria, whose relationships to the interests of man are often of great importance, and whose life-processes are so peculiar that they demand special manipulation. *Pathology* is that division of the subject which deals with plant diseases, chiefly those inflicted by other plants. It is this subject which has attracted a great deal of attention in connection with the work of agricultural experiment stations. *Economic botany*, closely allied to agriculture and horticulture, is a growing subject, which deals with plants from the standpoint of their usefulness to man. *Forestry* is a special division of

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economic botany which studies the proper handling of forests.

The literature of botany is too extensive to cite in any complete way, so that below are given only some of the more important works of a general nature. Under the articles ANATOMY, DISTRIBUTION OF PLANTS, ECOLOGY, MORPHOLOGY, PHYSIOLOGY, and TAXONOMY a selected list of elementary and advanced books treating those subjects is given. Also, in connection with the treatment of the larger groups of plants, the most important available literature is cited.

BIBLIOGRAPHY. Atkinson, *Elementary Botany* (New York, 1898); Bailey, *Botany* (New York, 1900); Baillou, *Dictionnaire de botanique* (Paris, 1876-92); Balfour, *Manual of Botany* (Edinburgh, 1875); Barnes, *Plant Life* (New York, 1898); Bentley, *Manual of Botany* (London, 1888); Bergen, *Foundations of Botany* (Boston, 1901); Bessey, *Botany for High Schools and Colleges* (New York, 1892); Britton, *Manual of Botany* (New York, 1901); Britton and Brown, *Illustrated Flora of the North United States* (New York, 1896-98); Darwin, *Origin of Species* (London, 1859); ib., *Variations of Animals and Plants Under Domestication* (London, 1868); ib., *Insectivorous Plants* (London, 1875); ib., *Movements and Habits of Climbing Plants* (London, 1865); ib., *Various Contrivances by Which Orchids are Fertilized by Insects* (London, 1862); ib., *Effect of Cross and Self-Fertilization* (London, 1876); ib., *Different Forms of Flowers on Plants of the Same Species* (London, 1877); ib., *Power of Movement in Plants* (London, 1880); Goebel, *Outlines of Classification and Special Morphology of Plants*, translation by Garnsey and Balfour (Oxford, 1887); Goodale, *Physiological Botany* (New York, 1885); Gray, *Manual of Botany* (New York, 1902); *Index Kewensis, An Enumeration of the Genera and Species of Flowering Plants* (Oxford, 1892-95); Jackson, *Guide to the Literature of Botany* (London, 1881); Kerner and Oliver, *Natural History of Plants* (New York, 1895); Müller, *Fertilization of Flowers* (London, 1883); Pavillard, *Eléments de biologie végétale* (Paris, 1901; Sachs, *History of Botany* (Oxford, 1890); Schimper, *Botanische Mitteilungen aus den Tropen* (Jena, 1888); Vine, *Students' Text-Book of Botany* (New York, 1896); De Bary, *Comparative Anatomy and Vegetative Organization of Phanerogams and Ferns*, translation by Bower and Scott (Oxford, 1884); De Bary, *Comparative Morphology and Biology of Fungi Mycetozoa and Fungi*, translation by Garnsey (Oxford, 1887); De Bary, *Lectures on Bacteria*, translation by Garnsey, revised by Balfour (Oxford, 1887); Sachs, *History of Botany, 1530-1860*, translation by Garnsey and Balfour (Oxford, 1890); Sohns-Laubach, *Introduction to Fossil Botany*, translation by Garnsey and Balfour (Oxford, 1891); Coulter, *Plant Relations* (New York, 1899); Coulter, *Plant Structures* (New York, 1900).

BOTANY, FOSSIL. See PALEOBOTANY.

BOTANY BAY. The popular name for any distant penal colony. It is the geographical name first given by the botanist Joseph Banks, who went with Cook on his first voyage in 1770 to an inlet near Sydney, New South Wales, on the eastern coast of Australia. Here the British Government, in pursuance of Pitt's policy to deport criminals, directed Commodore Phillip, in 1787, to establish a penal settlement. He selected a better site, however, farther north (1788). England altogether discontinued the transportation of criminals to New South Wales in 1840. It has often been proposed to establish an international 'botany bay' for the permanent seclusion of the worst criminal classes of all countries. See PENOLOGY.

BOTANY BAY KI'NO. See EUCALYPTUS.

BÖTEL, bē'tel, HEINRICH (1854—). A German tenor singer, born in Hamburg, where his first occupation was that of a cabman. Educated by Pollini, he made his début at the Stadttheater, Hamburg, in 1883, in the rôle of Lionel, in Flotow's *Martha*. The beauty of his voice has made Bötel a popular favorite upon the operatic stage of Germany, though he is considerably handicapped by his defects as an actor.

BOTELHO DE OLIVEIRA, bō-tā'lyō dā ō'-lē-vā'ē-rā, MANOEL (1636-1711). A Brazilian poet, born in Bahia. He studied law at the University of Coïmbra, Portugal, and upon his return to Brazil practiced as an advocate. In imitation of Góngora, he wrote a volume of Latin, Portuguese, and Italian poems, reckoned by the Academy of Lisbon as a classic work—*Musica do Parnasso* (1705).

BOTERO, bō-tā'rō, GIUSEPPE (1815-85). An Italian poet. He was born in Novara, studied at the University of Turin, fought in the campaign of 1848, was appointed professor of Italian literature in the College of Cortemilia in 1849, and was subsequently director of various lycées. His published works include *Ricciarda* (1854), *Raffaele* (1858), *Il Galeotto* (1859), and *Speranza* (1870).

BOTETOURT, bōt'e-tōōrt, NORBORNE BERKELEY, Baron (1717-70). A Colonial Governor of Virginia, appointed in 1768. Though he dissolved the Colonial Legislature in 1769 for passing resolutions condemnatory of several recent acts of Parliament, he nevertheless consistently opposed the arbitrary measures of the British Ministry for Colonial taxation, and, finding his protests unheeded, resigned in 1770.

BOTH, bōt, JAN and ANDRIES. The names of two Dutch painters. They were born in Utrecht about 1609-10. Their art united them closely, for they worked upon the same canvases, Jan painting in the landscape, in the style of Claude, and Andries doing the figures, in the manner of Bamboccio. They were pupils of Abraham Bloemart, but later went to Italy, where it is said the beauty of the scenery influenced Jan to devote himself to landscape painting. An example of the individual work of Andries is in the Dresden Gallery, but the best work of the brothers was done together, and so completely did their art blend that their paintings seemed to bear the impress of but one hand. Good examples of their style are in the National Gallery, the Louvre, the Amsterdam Museum, and at The Hague. The etchings of Jan, after his landscapes, are considered to equal his pictures. Andries was drowned in a canal at Venice, and his brother survived him but six years. Consult: H. J. W. Buxton and E. J. Poynter, *German, Flemish, and Dutch Painting* (London, 1881); C. E. Clement, *Painters, Sculptors, Architects, and Engravers* (Boston, 1899); A. G. Radcliffe,

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Schools and Masters of Painting (New York, 1898).

BOTH'NIA. The name formerly given to the territory on both sides of the Gulf of Bothnia (q.v.). The eastern portion is now comprised in Finland and the western belongs to Sweden.

BOTHNIA, GULF OF (Med. Lat., for Scand. *botten*, lake, sea). The part of the Baltic Sea lying to the north of the island of Åland, having on its eastern shore Finland, on the western, Sweden. Its greatest length is about 400 miles, and its average breadth 120 miles. At its narrowest point, the Strait of Qvarken (46 miles wide), the gulf is divided into two parts, the northern, which is more shallow and narrow, and the southern. Its depth varies from 20 to 50 fathoms, but both along its shores and in the middle are many small islands, sandbanks, rocks, and cliffs, called skaers, which render the navigation difficult, though on the whole it is less dangerous than other parts of the Baltic, and has many good harbors. The rivers which fall into this gulf, both from Sweden and Finland, are numerous, and the waters of the gulf itself are but slightly salt. In winter it is usually frozen so hard that the journey from Sweden to Finland can be made on sledges. The shores of the gulf are gradually rising, causing increasing shallowness of its ports, some of which have become inland towns. The rise of the bottom is estimated at nearly 5 feet per century.

BOTHWELL, bŏth'wĕl. A village in Lanarkshire, Scotland, on the right bank of the Clyde, 8 miles east-southeast of Glasgow (Map: Scotland, D 4). The river is here crossed by the celebrated *Bothwell Brig*, the scene of the bloody encounter between the Covenanters and the Royalists under Monmouth on June 22, 1679, when the former were defeated. Near the village are the magnificent Norman ruins of Bothwell Castle, to which the Earl of Bothwell carried Mary, Queen of Scots. Population, in 1900, 2500. Consult Duncan, "Bothwell Castle," in *Archæological Journal*, Vol. XLV. (London, 1889).

BOTHWELL, JAMES HEPBURN, fourth Earl of (?1536-78). A Scottish nobleman, husband of Mary, Queen of Scots. He was born probably in 1536 or 1537, and was brought up and educated by his granduncle, Patrick Hepburn, Bishop of Moray, at Spynie Castle. He was reputed a good scholar. His character, however, was vicious and unruly. On his father's death in 1556, as Earl of Bothwell and one of the most powerful nobles in Scotland, he proved himself an irreconcilable enemy of the English. At first he opposed the Reformation party, but on their accession to power changed his politics, and in 1561 formed one of the deputation of lords sent to convey the youthful Queen of Scotland to her kingdom. He was shortly after made a privy councilor; but his violence and misconduct became intolerable, and he was ordered to quit Edinburgh. In March, 1562, he and the Earl of Arran were committed to the castle for conspiring to seize the Queen's person. Bothwell made his escape, was recaptured at Holy Island, again got free, and sailed to France. He speedily returned, but, finding Moray close on his trail, embarked for the Continent. Not appearing at his trial, he was outlawed. In 1565, after the Queen's marriage with Darnley, he reappeared, and, having strongly espoused her cause against Moray and his party, was restored to favor and high influence. In October, 1566, while performing a judicial tour in Liddesdale, he was attacked by an outlaw and wounded, and the Queen manifested her interest in his danger by riding 20 miles and back to see him, a journey which brought on a dangerous fever. At Craigmillar, some time after, Bothwell attempted, unsuccessfully, to overrule her objections to a divorce from Darnley. A more thorough method presented itself to him, and on the night of February 9, 1567, Darnley was blown up at the Kirk of Field. Public opinion charged Bothwell with the murder, and he was formally indicted, March 28. He came to the trial attended by 4000 followers and received an easy acquittal. Two days after he carried the sword of State before the Queen at the opening of Parliament, and at its close all his lands and offices were confirmed to him. The leading nobles signed a bond approving of Bothwell's acquittal, and, commending him as a fit husband to the Queen, pledged themselves to stand by him. On April 24 Bothwell, accompanied by a strong force, carried off the Queen to Dunbar Castle; on May 6 he was divorced from his wife, and on the 15th his marriage with Mary was solemnized at Holyrood. He had previously been created Duke of Orkney. His triumph was short; the wrath of the nation was roused; at the end of one month Mary was a prisoner in Edinburgh, and Bothwell, pursued in his voyage to the Orkneys, where he had collected a small navy and turned pirate, fled to Norway, whence he was sent under arrest to Denmark, and there imprisoned for the rest of his life. The confinement drove him insane, and he died at Dragsholm Castle in 1578, leaving no heirs. His titles and estates were forfeited to the Crown. Consult: Schiern, *Life of Bothwell* (Edinburgh, 1880); Ellis, *Later Years of James Hepburn* (1861); Burton, *History of Scotland* (Edinburgh, 1873.

BOTOCUDO, bō'tō-kōō'dō (Portug. *botoque*, plug; see below), or AIMORÉ. A Tapuyan tribe living in the Sierra dos Aimorés and on Doce and Pardo rivers, in Minas Geraes, in southeastern Brazil. Like all the tribes of that stock, they are undersized, their features are repulsive, and their grade of intellect is very low. Until brought under subjection by the Government, they were naked cannibals. The name Botocudo, 'barrel-bung,' was given them by the Portuguese in allusion to large wooden labrets and ear-blocks with which they disfigure their ugly countenances. See TAPUYAN.

BOT'ONÉ, or **BOT'TONY** (OF. *botonné*, from *boton*, Fr. *bouton*, button). In heraldry, a cross botoné is a cross of which the ends are in the form of buds or buttons.

BOTOSHANI, bō'to-shä'nē. A town of Rumania, in Moldavia, situated 60 miles northwest of Jassy, on a branch line of the Lemberg-Czernowitz-Jassy Railway (Map: Turkey in Europe, F 1). It is irregularly built and contains a lyceum and a theatre. It carries on a considerable trade in cattle, grain, and wood. Population, in 1899, 32,193, of whom one-half were Jews.

BO-TREE. The name given to the sacred fig-tree, *Ficus religiosa*, or pipal (see PEEPUL), under which the Buddha, Prince Siddhārtha, sat

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during the night in which he received supreme enlightenment and attained to the Buddhaship. As bo-tree literally means 'Tree of Wisdom,' from Sinhalese *bo* = Skt. Pāli *bodhi*, wisdom, enlightenment, the name is applicable to any tree under which a Buddha receives the great spiritual enlightenment. The particular bo-tree, or pipal, under which the Sākya sage, Gotama, was seated when he became Buddha was situated at Uruvelā, the modern Gayā, in Behar, 150 miles southeast of Benares. The scene attendant upon the coming of the supreme enlightenment at dawn, under the bo-tree, is described with poetic imagination in the Pāli writings of the Buddhists, and is familiar to English readers in Sir Edwin Arnold's *Light of Asia*. The spot thus hallowed by tradition is marked by an ancient temple, nine stories high, which is now undergoing restoration. The present bo-tree at Gayā can hardly itself be very old, but from its sacred connections it is one of the two most venerated trees in the world. The second sacred bo-tree is situated at Anurādhapura, in northwestern Ceylon. This is said to be the oldest historically authenticated tree in existence. It is stated that when Buddhism was established in Ceylon, the Buddhist abbess Sanghamitta, a sister of the royal missionary Mahinda, brought a branch from the original bo-tree at Gayā, and planted it at Anurādhapura, B.C. 245. From this branch the present tree grew up, and its history is traced with the utmost detail for centuries in the native chronicles. Its leaves are most sacred relics for the thousands of Buddhist pilgrims that visit it. Buddhist temples elsewhere have bo-trees planted by them.

BOTRYCHIUM, bō-trĭk'ĭ-ŭm (Gk. *βότρυχος*, a curl or lock of hair, *βότρυς*, *botrys*, grape-cluster; refers to its fruit-clusters). A genus of ferns of the order Ophioglosseæ, having a short, erect rootstock, with clustered, fleshy roots, bearing a stalk, one part of which is sterile and fern-like, the other fertile and carrying the clusters of sporangia or spore-cases. The species are of little importance economically. The only British species is the *Botrychium lunaria* (moonwort), a little plant pretty frequent in dry mountain pastures, but not applied to any particular use. A species more worthy of notice is *Botrychium virginianum*, of which the geographical distribution is very remarkable. It abounds in many parts of the United States, in the mountains of Mexico, in Australia, in some parts of Asia, as the Himalaya Mountains, and is found also in Norway, although in no other part of Europe. It is large and succulent, and is boiled and eaten in the Himalaya, in New Zealand, etc. It is called rattlesnake-fern in some parts of America, from its growing in places where rattlesnakes are found. In the United States, Botrychium virginianum ranges from Washington to Colorado and Texas, and eastward, including Florida. Botrychium lunaria ranges from Colorado to New England, Lake Superior, and sparingly northward. *Botrychium simplex*, a rare species, with small fronds, is found from California and Yellowstone Park to Lake Superior and eastward. A variety, *compositum*, occurs in Alpine regions. *Botrychium lanceolatum* ranges from Colorado to Lake Superior, Ohio, New Jersey, and New England. *Botrychium lunarioides* is found from Massachusetts to Florida in dry, rich woods and shady pastures. It has two varieties: *obliquum* and *dissectum*. *Botrychium ternatum*, a variable species, occurs throughout North America.

BOTRYTIS, bō-trī'tĭs (Gk. *βότρυς*, *botrys*, a cluster of grapes). A genus of mold-fungi belonging to the Mucedineæ. The plant consists of a mycelium (see FUNGI) of more or less entangled threads, with shoots of the same nature rising up from them, and bearing the fructification at their extremity. Most of the species live upon dead leaves, decaying wood, and other vegetable material. Some are found on living animal tisues, whether always previously diseased or not is a question still unsettled. A remarkable species of this genus is the Muscardine (q.v.). Many of the species of Botrytis belong to what are known as the imperfect fungi, i.e. those of which the life-history is not fully known, the Botrytis being the only form discovered. A number of Botrytis forms are known to produce disease in plants by attacking them through their young tissues, but most of the fungi causing diseases, formerly referred to species of Botrytis, are now referred to other genera. *Botrytis douglasii* is the cause of a destructive disease of the Douglas fir and other conifers. *Botrytis cinerea*, which causes the ripe rot of grapes, is now referred to *Sclerotinia fuckeliana*, and a number of other species are considered as belonging to the same genus of fungi. The potato-rot (q.v.) fungus once referred to Botrytis is now called *Phytophthora infestans*.

BOTT, JEAN JOSEPH (1826-95). A German violinist. He was born in Cassel, Germany, where he received his first musical instruction from his father, the Court musician. After further studies with M. Hauptmann and L. Spohr, he won the Mozart scholarship (1841), and successively became solo violinist in the Electoral orchestra (1846) and Court kapellmeister at Meiningen (1857) and Hanover (1865). In 1885 he came to New York, where he died. His works comprise two operas—*Der Unbekannte* (1854) and *Aktäa, das Mädchen von Korinth* (1862)—and symphonies, overtures, violin concertos, pianoforte music, solos for violin, and songs.

BOT'TA, ANNE CHARLOTTE LYNCH (1820-91). An American author; born in Bennington, Vt. In 1855 she married Prof. Vincenzo Botta (q.v.). She published a book of poems (1848), besides many essays and reviews, promoted the establishment of Barnard College (q.v.), and founded the prize awarded every five years by the French Academy for the best essay on "The Condition of Women." Her *Handbook of Universal Literature* (1860) was formerly widely used as a text-book.

BOTTA, CARLO GIUSEPPE GUGLIELMO (1766-1837). An Italian historian. He was born in San Giorgio del Canavese, Piedmont, November 6, 1766, studied medicine in Turin, and, because of his active sympathy with the French Revolution, was arrested and imprisoned in 1792. Upon his release, in 1794, Botta went to France and became a physician in the Army of the Alps, taking part later in the expedition to Corfu. In 1799 he was appointed, with Carlo Giulio and Carlo Aurelio de Bossi, a member of the provisional government of Piedmont, hence called the 'Triumvirate of the Three Carli.' After the battle of Marengo he became a member

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of the Piedmontese Consulta, and later, after the union of Piedmont with France, was a deputy to the Corps Législatif, an office that he filled until the return of the Bourbons to power, despite the offense that he gave to Napoleon by designating his government as a despotism. In 1831 he was allowed to return to his native country, and was pensioned by Charles Albert. He died in Paris, August 10, 1837. His earliest volumes (Italian and French) are: *Storia naturale e medica dell' isola di Corfu* (1797); *Souvenirs d'un voyage en Dalmatie* (1802); *Précis historique de la Maison de Savoie* (1803); and *Storia della guerra dell' indipendenza degli Stati Uniti d' America* (1809). This work was originally suggested to Botta in the course of a conversation with Manzoni's mother in Paris. It was received with great favor when first published, and was speedily translated into French and English. Even recently it has been pronounced by an English critic the best history of the subject written outside the United States. Botta's great work, however, is his *Storia d'Italia dal 1789 al 1814* (1824), which received the quinquennial prize of 1000 Tuscan dollars from the Accademia della Crusca at Florence, and in a short time ran through fourteen editions. Later it was included in a *Storia d'Italia*, in 20 volumes, consisting of Guicciardini's work (1490-1534) and Botta's continuation of it (1535-1789). Botta's style is marked by dignity, which at times is almost severe, and by a pervading consciousness of an historian's responsibility. For his biography, consult: Dionisiotti (Turin, 1867); Pavesio (Florence, 1874); Scipione Botta (Florence, 1877).

BOTTA, PAUL EMILE (1802-70). A French archæologist and traveler. He was born in Turin, the son of Carlo Giuseppe Guglielmo Botta. While still young he undertook a voyage round the world, and remained some time on the west coasts of America, where he zealously collected treasures of natural history. In the year 1830 he went to Egypt, where he entered the service of Mehemet Ali as physician, and in this capacity accompanied the Egyptian expedition to Sennar. Here he formed a very considerable zoölogical collection, with which he returned to Cairo in 1833. The French Government now appointed him consul in Alexandria, from whence he undertook a journey to Arabia, the results of which he published in a work entitled *Relation d'un voyage dans l'Yémen, entrepris 1837, pour le muséum d'histoire naturelle de Paris* (1841). At the suggestion of the Orientalist Julius Mohl, of Paris, he was by the Government sent as consular agent to Mosul, and at this place he commenced a series of discoveries which form an epoch in archæological science. Early in the spring of 1843 he began his diggings in the heaps of ruins at Khorsabad, near the Tigris, for monuments of Assyrian antiquity. These excavations revealed much valuable archæological material, including the ruins of the palace of Sargon, King of Assyria (B.C. 722-705). The *Journal Asiatique* soon contained accounts of the success with which his enterprise and perseverance were rewarded, and also disquisitions on the extremely difficult subject of the cuneiform writings of the Assyrians, which afterwards appeared as a separate publication under the title *Mémoires de l'ecriture cunéiforme assyrienne* (1848). The French Government took up the matter warmly; Flandin, a practiced draughtsman, was sent out for the purpose of making sketches on the spot of the sculptures on alabaster, so apt to fall to pieces; and a commission of learned men was appointed for the purpose of conducting the publication of a magnificent archæological work, which shortly afterwards appeared under the special superintendence of Botta himself, with the title *Monuments de Ninive découverts et décrits par Botta mesurés et dessinés par Flandin* (1847-50). In 1848 he published the *Inscriptions découvertes à Khorsabad.* In 1846 Botta was appointed consul at Jerusalem, and in 1857 at Tripoli. He returned to France in 1868, and died at Achères, near Poissy. See ASSYRIA.

BOTTA, VINCENZO (1818-94). An Italian-American educator. He was born in Piedmont, Italy, was educated at the University of Turin, became a professor there, was elected to the Sardinian Parliament in 1849, and was appointed commissioner to examine the German educational system in 1850. He came to the United States for the same purpose in 1853, and soon afterwards was naturalized and appointed professor of Italian language and literature in the University of the City of New York. He remained in this position till his death. In 1855 he married Anne Charlotte Lynch, a well-known author. His best-known works are: *Account of the System of Education in Piedmont; Character and Policy of Cavour* (1862); *Dante as a Philosopher, Patriot, and Poet* (1865); and "An Historical Account of Modern Philosophy in Italy," in Ueberweg's *History of Philosophy from Thales to the Present Time* (1872).

BOTTALLA, bŏt-täl'lä, PAOLO (1823—). An Italian historian. He was born in Palermo, Sicily, and was educated at the Jesuit colleges in his native city and in Rome. He subsequently held successive professorships in Church history and theology in Palermo, in Rome, at the College of Saint Bruno, Wales, and in Poitiers. He writes in the Italian, French, and English languages, among his works being the following: *Corso di storia e di geografia universale* (Palermo, 1860); *L'Autorità infallibile del Papa nella Chiesa e le sue relazioni collo stato* (1880); *The Papacy and Schism* (1869); *The Pope and the Church Considered in Their Mutual Relations,* etc. (1868); *Pope Honorius Before the Tribunal of Reason and History* (1868).

BOTTARI, bŏt-tä'rē, GIOVANNI GAETANO (1689-1775). A learned Italian prelate, born in Florence. He studied ancient literature and eloquence under Biscioni, and subsequently applied himself to mathematics, philosophy, and theology. He soon obtained a great reputation for the delicacy of his style. The Accademia della Crusca intrusted him with the care of a new impression of its famous dictionary. Clement XII. appointed him librarian of the Vatican. The works of which Bottari was either the author or editor are very numerous. The principal are his edition of Vergil from the Vatican manuscript; his elaborate treatises on the catacombs of Rome and on the Vatican; his *Del Museo Capitolino,* and his dissertations on Dante, Boccaccio, and Livy.

BOTTESINI, bŏt'te-zē'nē, GIOVANNI (1823-89). An Italian musician and composer; born at Crema, Lombardy, December 24, 1823. He

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was one of the greatest performers on the double bass that ever lived, and practically the only one known to fame as a concert soloist. He entered the Milan Conservatory, and studied double bass under Rossi and Basili, and theory under Vaccai, Piantanida, and Ray. From 1840 to 1845 he was a concert virtuoso throughout Italy. In 1846 he went to Havana, Cuba, where, during his régime as conductor, his opera *Cristoforo Colombo* was produced. During his residence in Cuba he made occasional visits to the United States. In 1849 he made a tour through England; for two years following was conductor at the Théâtre des Italiens, Paris; afterwards resuming his concert tours. In 1861 he was appointed conductor at the Bellini Theatre, Palermo, and in 1863 held a similar post in Barcelona. He established in Florence a society for the cultivation of German classical music, conducted the opera at Cairo, Egypt, and at the Lyceum, London, in 1871. Ultimately he settled in Parma and became director of the conservatory there. His oratorio, *The Garden of Olivet*, was given under the composer's direction at the Norwich (England) Musical Festival in 1887. His published works include operas, symphonies, overtures, quartets, etc., but although he wrote many compositions for the double bass, none of these appear to have been published. He died in Parma, July 7, 1889.

BÖTTGER, bĕt'kĕr, ADOLF (1815-70). A German translator and poet, born in Leipzig. He studied at the University of Leipzig and won high praise as a translator of the English poets, including the complete works of Byron (1840, and in frequent and variously arranged editions), and the poems of Goldsmith (1843) and of Milton (1846). He also made renderings of Ossian (1847) and (1856) of Longfellow's *Hiawatha*. His own works, displaying often the influence of English prototypes, include: *Gedichte* (1846); *Die Pilgerfahrt der Blumengeister* (1851); *Das Buch der Sachsen* (1858); and *Neue Lieder und Dichtungen* (1868).

BOTTGER, BÖTTCHER, or **BÖTTIGER**, JOHANN FRIEDRICH (1628-1719). The inventor of Saxon porcelain. He was born at Schleiz, in the Principality of Reuss-Schleiz. He was apprenticed to an apothecary in Berlin, but became an enthusiast in the search for the philosopher's stone, and carried on extensive researches under the patronage of Prince Egon von Fürstenberg in Dresden. As he did not succeed in making gold, he was induced to use the chemical knowledge he had acquired in experiments upon clays, with a view to the manufacture of porcelain, and factories for this purpose were erected under royal patronage, and the celebrated Meissen porcelain was the result. As a security against the revelation of the art of making it, Böttger and his assistants were treated as prisoners, and when Saxony was invaded by Charles XII. of Sweden in 1706, they were secretly removed from Dresden to Königstein. His success was not without its reward. He was appointed to supervise the porcelain manufacture in 1708, and shortly afterwards the Meissen porcelain was brought out. In 1716 he entered into negotiations to reveal the secrets of the process, but was discovered and imprisoned.

BOTTICELLI, bŏt'tĭ-chĕl'lĭ, ALESSANDRO FILIPEPI (c.1447-c.1510). An Italian painter, born in Florence. His birth is differently stated as in 1446 and 1447, his death as in 1510 and 1515. His father, Mariano Filipepi, a well-to-do citizen, wished to give his son a good education; but the boy's strong will showed itself in a violent distaste for learning, and his father, despairing of turning him into a scholar, placed him in the shop of a goldsmith named Botticello. From this master Botticelli took not only the name by which he was to become famous, but also the use of the gold which he afterwards turned to account in the foliage of his backgrounds, in his angels' rippling hair, and in the embroidered tissues of his virgins' robes.

Before long, however, he evinced a strong desire to become a painter, and accordingly entered the studio of the Carmelite monk Fra Filippo Lippi, then at the height of his reputation. Many of his early works show a marked influence of Andrea del Verocchio, an allegorical figure of "La Fortezza," and one of them is painted in the manner of the brothers Pollajuoli. When Filippo Lippi died, in 1469, Botticelli, then only about twenty-two years of age, was considered one of the first painters in Florence. His high reputation at this time is proved by the distinguished patrons who employed him—namely, the families of Tornabuoni, Vespucci, Palmieri, Pucci, and, above all, Lorenzo de' Medici, who from the first showed Botticelli a generous patronage which he never withdrew. At that time, also, many important commissions were assigned to him. Thus, in 1475, when the Pazzi plot nearly overthrew the Medici, Botticelli was called upon to paint the portraits of the offenders, according to usage, on the walls of the Palazzo Vecchio. In 1480, to the order of the Vespucci family, he painted the fresco of Saint Augustine on the wall of the Church of the Ognissanti.

Finally, about 1481, Botticelli was summoned to Rome by Sixtus IV., to assist in painting his newly erected chapel in the Vatican. According to Vasari, he was made chief superintendent of the work; but it is more probable that his supervision was mainly in the distribution of the spaces for the frescoes. His co-workers were Ghirlandajo, Perugino, Cosimo Rosselli, and Luca Signorelli. Botticelli himself painted a number of the twenty-four portraits of Popes in the upper niches of the chapel, and three of the twelve frescoes—namely, "The Life of Moses," "The Temptation of Christ," and the "Punishment of Korah, Dathan, and Abiram." These compositions illustrate both the vigor of his imagination and the limitations of his genius; for, while many of the separate groups are strikingly beautiful and exhibit an extraordinary amount of life and motion, there is a want of harmony in the whole, and in several cases the figures are crowded together in confused groups.

Botticelli returned to Florence about 1484, and, according to Vasari, "being a man of profound thought, composed a commentary on Dante's poem, illustrated the *Inferno*, and had it printed." The commentary has not come to light, but the first Florentine edition of Dante (published by Baldini in 1481) contains engravings on copper to illustrate the *Inferno* which were made from Botticelli's drawings, and it is believed that Botticelli himself executed several of these plates. Moreover, ninety-six sheets of his drawings, representing all but seven cantos of the *Divine Comedy*, are still intact,

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BOTTICELLI (ALESSANDRO FILIPEPI)

"PRIMAVERA" (SPRING), FROM THE PAINTING IN THE ACADEMY OF THE FINE ARTS, FLORENCE

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eighty-six of them being in the Berlin Museum. All of these were sketched in silver point and finished with the pen. Some were completed in body colors, and it is supposed that the original scheme was for the whole to be carried out in colors, in the style of the earlier illustrations of Dante.

It was also after his return from Rome that Botticelli became a disciple of the Dominican friar Fra Girolamo Savonarola, who came to Florence about 1490. Vasari says that in his religious frenzy Sandro entirely abandoned painting, and was reduced to misery and want. But there is abundance evidence of the falsity of this statement; for though he naturally ceased painting profane subjects, and was a firm believer in the friar's prophecies until his death, he was to the last one of the counselors of the Medici in the public works. Thus, in 1491 he and Ghirlandajo had charge of the mosaic work in the cathedral at Florence, and competed in plans for finishing the façade; and in 1503 he was one of those consulted as to the best place for Michelangelo's statue of David. But of more significance than all is the fact that while Savonarola was burned in 1498, it was in 1500 that Botticelli painted one of his most beautiful religious pictures, "The Nativity," in the National Gallery, London. This work is doubly interesting because it shows that though the artist was still constant to the memory of Savonarola, he had lost nothing of the wealth of his fancy, nothing of his tender sentiment, and nothing of that distinction of attitude which characterized his early works.

The story of his poverty is also probably exaggerated, for Botticelli's income tax for 1498 shows that he was then keeping house with his nephew in Florence, and at the same time possessed 'a gentleman's villa' and vineyards outside the gates of San Frediano. His father, too, seems to have been in comfortable circumstances, since in 1510 he purchased the family vault in the Church of the Ognissanti, where Sandro is now buried.

Probably no artist in the entire range of the Italian Renaissance has evoked such contrary opinions of his merits as has Botticelli. As has been seen, his reputation among his contemporaries was high; but later, when the merely technical excellences of the art of painting, and especially the quality of surface fidelity, had assumed an exaggerated importance, he went out of favor, and for three hundred years his work was not considered as a factor in the development of art. To-day, however, with the freedom from the tyranny of conventional criticism, with the opportunities of forming individual opinions instead of echoing those of the acknowledged critic of the day, Botticelli has fully regained favor. One reason for his present popularity is that in the breadth and richness of his culture, in the varied character of the subjects he chose, and in the greatness of his aim, he represents the most striking features of the memorable period in which he lived. For the range of his subjects extended from the great scriptural compositions, "through the most touching scenes in the life of the Virgin," to events in classic history, and thus in his works the brilliancy of the Medicis' Court, the force of Christian traditions, and those classic myths that were the delight of Renaissance scholars, are all present in varying degrees. Nor did he escape the errors of his day. The superabundance of his ornament, the graceful yet mannered form of his draperies, and the introduction of gold into these and other accessories were to some extent due to the demands of his patrons.

But though he is thus a reflex of his time, Botticelli's works are yet pronounced and individual. Living in a generation of naturalists, he might have been a mere naturalist among them. There are traces enough in his work that he was deeply impressed by nature, by man, and by things considered as plastic objects. The sea, rocky mountain scenery, soft woodland landscapes, and gardens of every variety of rose, appear again and again in his paintings. But Botticelli was essentially a visionary painter, and to represent merely the outward image was not enough for him. Instead, he clothed all he saw with the color of his own moods and ideas, and thus made each of his works an outgrowth of his own personality. In color, too, he showed independence, for while in his youth he used the gay colors common in his age, in his later works his color scheme was more subservient to the central idea and sentiment of his work. He was also one of the first to accept art as an instrument of general culture, and as much at the service of the world as of the Church. Before him, few ventured outside the range of subjects provided by the Scriptures. But while Botticelli painted religious works, he painted them with an originality of feeling which appeals to the spectator as the real matter of the work through the veil of its ostensible subject. On the other hand, his Venuses have so much feeling and such tender grace that they seem "Madonnas masquerading in mythology."

In his Madonnas the chief characteristics of his art are revealed. Nowhere does he give greater proof of his personal feeling and creative energy than in depicting Mary and her Child. In the Madonnas at Palazzo Corsini (Rome) and at the Spedale degle Innocenti (Florence), the influence of Filippo Lippi is apparent. Like those of the friar, these virgins, though lacking in religious feeling, are full of a naïve tenderness and affectionate maternity. Even the style of arrangement and mode of drapery are copies of the mode carried out by Filippo. In the later Madonnas Filippo's influence is still seen in the Virgin's slenderness. The motive, too, is almost the same—Mary embracing the Child, who stands in her lap and raises His right hand in blessing toward the throng of worshipers. But the veil of sorrow has fallen over the youthfulness that delighted in his earlier works; Mary's joy as a mother is under the shadow of a prophetic foreboding of woe to come. This mystic union of the highest blessedness with the sharpest anguish, the result of Savonarola's mighty influence on the painter, is the keynote of all his later Madonnas. Sometimes the Virgin's sadness is communicated to the angels, but usually it is the Child who feels the burden of an inexorable destiny and turns to His mother with tender caresses. Even to his profane subjects Botticelli communicates this element of sadness, and nothing is stranger than to see the bright Greek myths tinged with mediæval colors and shadowed with the "grim humor of Florentine thought."

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Equally interesting and important are his mythological works, painted for the most part in the period after his return from Rome, before he came under the influence of Savonarola. The most famous of these is the "Realm of Venus," usually known as "Spring"—a charming composition of classical figures, over life-size, in a beautiful spring landscape, redolent with flowers. Its companion piece, the "Birth of Venus," represents the goddess perfectly nude, except for the covering of her wind-blown hair, being wafted ashore by the breath of the wind-gods. It is the most chaste and refined treatment of the nude, except perhaps Giorgione's "Sleeping Venus," in modern painting. Both these pictures were painted for the Medici; the former is in the Uffizi, the latter in the Florence Academy. Among his other important mythological works are "Calumny," after a description of a painting of Apelles by Lucian, in the Uffizi, Pallas taming a centaur (Pitti), and "Mars and Venus," in the National Gallery, London.

Although too subjective to be a great portraitist, Botticelli executed a number of portraits of a subtle charm. Among the best known are those of the Medici and other Florentine notables in the "Adoration of the Magi" (Uffizi); his "Giuliano dei Medici," the original being in the Gallery of Bargamo, not in Berlin, as Morelli has shown; and, most beautiful of all, the portrait of an unknown woman in the Frankfort Museum.

Those who demand that a work of art shall merely please the eye will not be satisfied with Botticelli's works. There is none of the beauty of Raphael's figures in his typical Madonna, with her long, thin, and melancholy face, her over-ripe lips, her prominent chin, and her long, lank limbs. But the lines that give character to a face, and those qualities which are directly life-communicating and life-enhancing, are almost never lacking in his works, and it is these characteristics that give all his productions, religious, political, or allegorical, an eternal human interest.

Since Botticelli, except in one instance, neither signed nor dated his works, it is impossible to arrange them chronologically. The greater number of his best productions are in Florence, but the Berlin Museum is also well supplied. A number of these have been mentioned in the course of this narrative. Sandro also had an important school, by whom many works assigned to him, like the "Venus" in the Berlin Museum, a copy of the figure in the "Birth of Venus," were probably painted. Among his chief works not mentioned above are his two best-known Madonnas, both circular pictures, and in the Uffizi. The "Magnificat" represents Our Lady dreamy and passionate, crowned and surrounded by angels with wistful, eager faces. It is the best specimen of his early period, as its companion piece is of his later. Among the best-known of his remaining works are "Scenes from the Life of Saint Zenolius," in Dresden; his frescoes of the Villa Lemmi, now in the Louvre, and his large "Assumption of the Virgin," in the National Gallery, London.

BIBLIOGRAPHY. Berenson, *The Florentine Painters of the Renaissance* (New York and London, 1898); Cole, *Italian Masters* (New York, 1892); Cartwright, *The Painters of Florence* (London, 1901); Crowe and Cavalcaselle, *History of Painting in Italy* (London, 1864); Crowe, in *Gazette des Beaux-Arts* (Vol. II., 1896); Lander, "A New Botticelli in Florence," *Art Journal* (London, 1900); Lippmann, *Sandro Botticellis Zeichnungen zu Dantes Göttlicher Comödie* (Berlin, 1887); Müntz, *Les Précurseurs de la Renaissance* (Paris and London, 1882); *Les Collections des Médicis au XV. Siècle Appendice aux Précurseurs de la Renaissance* (Paris and London, 1888); and "Apropos de Botticelli," *Gazette des Beaux-Arts* (Paris, 1898); Pater, *Studies in the History of the Renaissance* (London, 1873); Plunkett, *Sandro Botticelli* (London, 1900); Phillimore, *Botticelli* (New York, 1894); Steinman, *Botticelli* (English translation, Dodgson, New York, 1901); Supino, *Sandro Botticelli* (Florence, 1900); Ulmann, *Sandro Botticelli* (Munich, 1893); Woermann, "Sandro Botticelli," in Dohme's *Kunst und Künstler* (Leipzig, 1878); Vasari, *Lives of Seventy of the Most Eminent Painters, Sculptors, and Architects* (English translation, E. H. and E. W. Blashfield, and A. A. Hopkins, New York, 1896); Venturi, *Tesori d'Arte Inediti di Roma* (Rome, 1896); Waagen, *Treasures of Art in Great Britain* (London, 1852); and Warburg, *Sandro Botticelli's Geburt der Venus und Frühling* (Hamburg and Leipzig, 1893).

BÖTTICHER, bĕt'-tĭ-kĕr, KARL (1806-89). A German archæologist, born in Nordhausen. He studied at the Academy of Architecture in Berlin, and was afterwards appointed an instructor in the School of Design of the Industrial Institute there. In 1844 he was appointed a professor in the Academy of Architecture. His chief work is the *Tektonik der Hellenen* (1844-52), a splendid contribution to the study of Greek architecture. Others of his works are: *Bericht über die Untersuchungen auf der Akropolis in Athen* (1863); *Der Zophoros am Parthenon* (1875); and *Die Thymele der Athena Nike auf der Akropolis von Athen* (1880).

BÖTTICHER, KARL HEINRICH VON (1833—). A German statesman. He was born in Stettin, and was educated at the universities of Würzburg and Berlin. He was Governor of Schleswig in 1876, Lieutenant-General of Schleswig-Holstein in 1879, Secretary of the Interior in 1881. In 1888 he became vice-president of the Prussian Ministry of State, and in 1898 Lieutenant-General of the Province of Saxony. As the representative of the Chancellor he introduced numerous social reforms, and the enactment of the invalid and old-age insurance laws, in 1889, was due principally to his splendid energy and executive ability.

BÖTTICHER, PAUL. See LAGARDE, PAUL ARSTON DE.

BÖTTIGER, bĕt'tĭ-gĕr, CARL VILHELM (1807-78). A Swedish writer. He was born in Westerås, and studied at the University of Upsala, where, after extensive travels, he was appointed professor of modern literature in 1845, and in 1858 professor of æsthetics, from which post he retired in 1867. He was exceedingly active as translator, poet, dramatist, and literary critic. Most of his publications in the latter capacity appeared among the *Transactions* of the Swedish Academy. It is perhaps by his verse that he is known to best advantage. His publications include: *Lyriska stycken* (Lyrical Pieces, 1837-39); *Religiösa sånger* (Religious Songs, 1841); and translations of Tasso's *Gerusalemme Liber-*

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ata (1842-51), and Dante's *Divina Commedia* (1846-51). His collected works appeared at Stockholm (6 vols., 1856-81).

BÖTTIGER, bĕt'tĭ-kĕr, KARL AUGUST (1760-1835). A German archæologist. He was born June 8, 1760, at Reichenbach, in Saxony, and studied in Leipzig. In 1791, chiefly through the influence of Herder, he was appointed director of the gymnasium, and consistorial councilor at Weimar. Here he enjoyed the stimulating society of Herder, Wieland, Goethe, and others. His literary activity at this period was prodigious. He edited several journals, and wrote multitudes of reviews, biographical notices, etc., for the *Allgemeine Zeitung.* In 1804 he was called to Dresden, where he began to deliver lectures on special branches of classical antiquities and art. In 1832 Böttiger was elected a member of the French Institute. He died November 17, 1835. Among his important works are: *Sabina oder Morgenscenen im Putzzimmer einer reichen Römerin* (Leipzig, 1803; 3d ed., Munich, 1878), a study of the household life of the Roman women; *Die Aldobrandinische Hochzeit* (Leipzig, 1810); *Kunstmythologie* (Dresden, 1811); *Vorlesungen und Aufsätze zur Altertumskunde* (Leipzig, 1817); *Amalthea oder Museum der Kunstmythologie* (3 vols., Leipzig, 1821-25); *Ideen zur Kunstmythologie* (2 vols., Dresden and Leipzig, 1826-36). His minor writings in Latin and German were collected by Sillig and published in 1837-38. Consult: Karl Wilhelm Böttiger, *Karl August Böttigers Eine biographische Skizze* (Leipzig, 1837); and his *Litterarische Zustände und Zeitgenossen* (Leipzig, 1838); which he published from his father's papers.

BOTTLE (Fr. *bouteille,* dim. of *botte, boute;* from Low Lat. *buticula,* dim. of *but[t]is, butta,* flask, Eng. *butt*). A vessel, generally of a round shape, with a narrow neck, for holding liquids. Bottles are now usually made of glass or earthenware; but the first bottles were made of the skins of animals, mostly goats. Of this kind were the bottles spoken of in Scripture. Skin bottles are still used in southern Europe for the transport of wine, and by tribes of Africa and Asia for carrying water. The ancient Egyptians made bottles of most elegant form and exquisite workmanship, of alabaster, stone, gold, ivory, and other substances. The Italian peasants carry, slung round their necks, bottles made of the rind of the gourd, which, when dry, is as hard as wood. Bottles made of glass will be treated under GLASS.

BOTTLE-CHART, BOTTLE-PAPERS. A chart which purports to show the track of sealed bottles thrown from ships into the sea. It is a well-known practice, on long voyages, to throw sealed bottles containing some intelligence into the sea, in the hope that these messengers may be picked up, and the information inclosed may reach its proper destination. The frequency of these instances at length led to the inference that by such means the determination of currents might be illustrated. Lieutenant Beecher, an English naval officer, has the merit of having constructed, in 1843, a chart of bottle voyages in the Atlantic, his facts being drawn from the numerous cases that had occurred. The time which elapses between the launching of the bottle from the ship and the finding it on shore, or picking up by some other ship, has varied from a few days to sixteen years; while the straight-line distance between the two points has varied from a few miles to 5000 miles. Of the actual length of the curved line followed by the bottle, little or nothing is known; but some are believed to have exceeded 8000 miles. The bottle-chart has been reëdited and reëngraved from time to time, and published in the *Nautical Magazine;* it is marked by several hundred straight lines, each drawn from the latitude and longitude of immersion to the latitude and longitude of the finding. Charts of this sort are now prepared at the United States Hydrographic Office, not for general circulation, but for information of the office; and from the records thus established current-charts are prepared and corrected. Papers printed in several languages are furnished by the hydrographer to masters of ships for the purpose of putting in bottles; the paper contains a request for their return when found to the nearest United States consul, who will forward them to Washington, with a statement in regard to the circumstances of their discovery.

BOTTLE-FISH, BOXFISH. See SWELLFISH.

BOTTLE-GLASS. See GLASS.

BOTTLE-GOURD (gourd used for making bottles; see below), *Largenaria.* A genus of plants of the natural order Cucurbitaceæ, nearly allied to the Gourd (*Cucurbita*), in which it was until recently included. One of the most marked distinctions between them is the very tumid border of the seeds of the bottle-gourds, which have also all the anthers separate, and have white flowers, while those of the gourds proper are yellow. The common Bottle-Gourd or False Calabash (*Lagenaria vulgaris*) is believed to be a native of India and other warm parts of the Old World, but is now common almost everywhere in warm climates. It is a climbing, musky-scented annual, clothed with soft down, having its flowers in clusters, and a large fruit, from 1 to even 6 feet in length, which is usually shaped like a bottle, an urn, or a club. The fruit has a hard rind, and when the pulp is removed and the rind dried, it is used in many countries for holding water, and is generally called a Calabash. The bottle-gourd, in its wild state, is very bitter, and is said to be poisonous, and even in cultivation some of its varieties exhibit not a little of the bitterness and purgative properties of colocynth. The bottle-gourd appears to have been introduced into Europe about the close of the Sixteenth Century; but it requires for its advantageous cultivation a warmer climate than that of any part of Great Britain, where, although it succeeds well enough in a hotbed, it is chiefly known as an object of curiosity. It is, however, much cultivated in warmer countries as an esculent, and is an important article of food to the poorer Arabs, who boil it with vinegar, or make a pudding of it in its own rind with rice and meat. It is also used when young as we employ summer squash. This plant is often grown in the United States, where it is known as Hercules's-club, sugar-trough, snake, dipper-gourd, etc. For illustration, see CUCUMBER.

BOTTLEHEAD, or **BOTTLENOSE** (so named from the shape of the snout, or head). A whale (*Hyperoödon rostratus*) closely allied to the sperm-whale, frequenting the Arctic and North Atlantic. It reaches a length of 30 feet, and has the snout produced into a beak, as in

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the dolphins; the forehead rises suddenly from the beak, and is remarkably elevated, owing to large bony crests rising over the bones of the upper jaw. The teeth are only two in number, and are situated in the fore part of the lower jaw, pointed, but sometimes completely hidden. There is a dorsal fin, rather small in proportion to the size of the animal, and placed farther back than in the common dolphin. The blowhole is crescent-shaped, the points of the crescent directed backward. The skin is smooth and glossy, of a blackish lead-color on the back, gradually becoming lighter on the sides, and whitish on the belly, turning yellowish-brown in old age.

These small whales travel in bands of four to ten, and keep just south of the limits of the Arctic ice, moving northward in summer and southward in winter. They are active, leaping out of the water, and curious rather than alarmed by the presence of boats. They feed mainly on squids, for which they are believed to dive to a very great depth. They are pursued and harpooned for the sake of their oil, resembling and equal to sperm, of which a large one will yield two tons, besides 200 pounds of spermaceti.

The same name is often applied to several other of the smaller cetaceans, such as dolphins and blackfish, with protruding snouts.

BOTTLENOSE. In Great Britain, a puffin (q.v.).

BOTTLE-TREE (so named from the shape of the trunk and the water it contains; see below), *Sterculia rupestris*. A native of Australia, noted for great globular expansion between the ground and the branches; or, where the soil is without rocks, for a trunk in the shape of an ordinary bottle, the limbs appearing to grow from the mouth. It belongs to the order Sterculiaceæ, and is of middling stature. The wood is soft and brittle; the leaves are from 2 to 4 inches long, entire, stalked, and lance-shaped; the flowers inconspicuous, on short panicles, arising from the axils of the leaves; calyx in the males, five-cleft, the stamens numerous; the fruit, of five-stalked, leathery follicles containing six seeds. According to von Müller, the stems of this tree hold considerable quantities of water, a fact often taken advantage of by travelers and the aborigines, who cut holes into the soft wood to get the supply of water. There are a number of other species to which the name 'Bottle-tree' is applied. Some of them are important food-plants of the natives of Australia, who eat their roots, which are filled with a gum similar to gum tragacanth. For illustration, see BREAD-FRUIT.

BOTTLING AND BOTTLING MACHINERY. Bottling is practiced wherever liquids or merchandise of any kind is placed in bottles for preservation or sale. The materials bottled on the largest scale are beers, wines, and liquors, mineral and other table waters, and such non-alcoholic beverages as soda-water, ginger ale, and sarsaparilla. Some or all of the following processes usually are involved: (1) Cleansing the bottles; (2) cleansing the corks; (3) filling, corking, labeling, and tin-foiling or capping the bottles. In addition, some goods, such as beer, are steamed or pasteurized after the bottles are corked. In some bottling establishments the operations include the preparation of the materials bottled, such as carbonated waters; but in this article it is assumed that the various liquids are ready for bottling, and that machines are used throughout. Clean bottles are essential, particularly for the higher grades of goods. The slightest speck of dirt might seriously damage a bottle of champagne or mineral water, and fermentable matter left in old bottles might ruin other beverages. New bottles are easily cleansed by washing and rinsing; but in many industries the bottles are used repeatedly, and must be cleaned as often as they are returned to the bottler. Old corks are removed from the bodies of bottles by special apparatus. Before being washed bottles are soaked, where necessary, in tanks containing hot water, or some other cleansing solution. Soaking-wheels are sometimes employed. These contain pockets in which the bottles are laid horizontally, mouth outward. The weight of the bottles as they are successively added causes the wheel to revolve slowly through the water in the tank. After having been soaked the interiors of the bottles are washed or scrubbed by means of brushes revolving at speeds as high as 2800 revolutions per minute. Both bristle and rubber brushes are used, though the former are less durable and leave bristles in the bottles. Some of the rubber brushes consist of elastic rubber stretched between two forked springs, and a more recent rubber brush has three prongs, which are spread by centrifugal action. A single steam-driven washer will clean 60 to 75 dozen bottles per day. The bottles are then placed upside down on rinsers, the essential features of which are vertical tubes, closed at the top, except for small holes, through which jets of water under pressure are emitted. Each rinser includes 24, 36, or more spouts, mounted on horizontal plates, with water-supply pipes beneath.

Filling-machines may be operated by siphonage from open tanks or by air or gas pressure from closed tanks. The latter is preferable, and sometimes essential, for carbonated beverages or any other liquids that might be injured by exposure. In the siphon-fillers the bottles are placed on the long leg of a siphon, the short leg of which is immersed in the filling-tank. The weight of the bottle tilts the siphon sufficiently to free the end of its short leg from the sloping side of the tank, thus permitting the liquid to flow into the bottle. An automatic float maintains a uniform supply of liquid in the filling-tank. In the pressure fillers the siphons and open reservoir give place to a system of piping, and the barrel or other closed receptacle containing the supply of liquid. Air or gas under pressure is admitted to the supply-barrel and forces the liquid into the bottles. The pipes to the latter are controlled by cocks or gates. Pressure fillers, like the rinsers, are also mounted so that they may be revolved. Waters highly charged with carbonic-acid gas, like seltzer in siphons, present a different problem in filling. They may supply their own pressure, wholly or in part, and special precautions may be necessary to prevent injury to the operators from bursting bottles. Siphon bottles are extra strong, and are tested in advance of use. In addition, the bottles are placed in strong iron cages or traps while being filled, and the workmen wear masks, gloves, sleeves, and aprons of rubber as a protection against flying glass from bursting bottles. Siphon bottles are filled upside down, through the siphons. Com-

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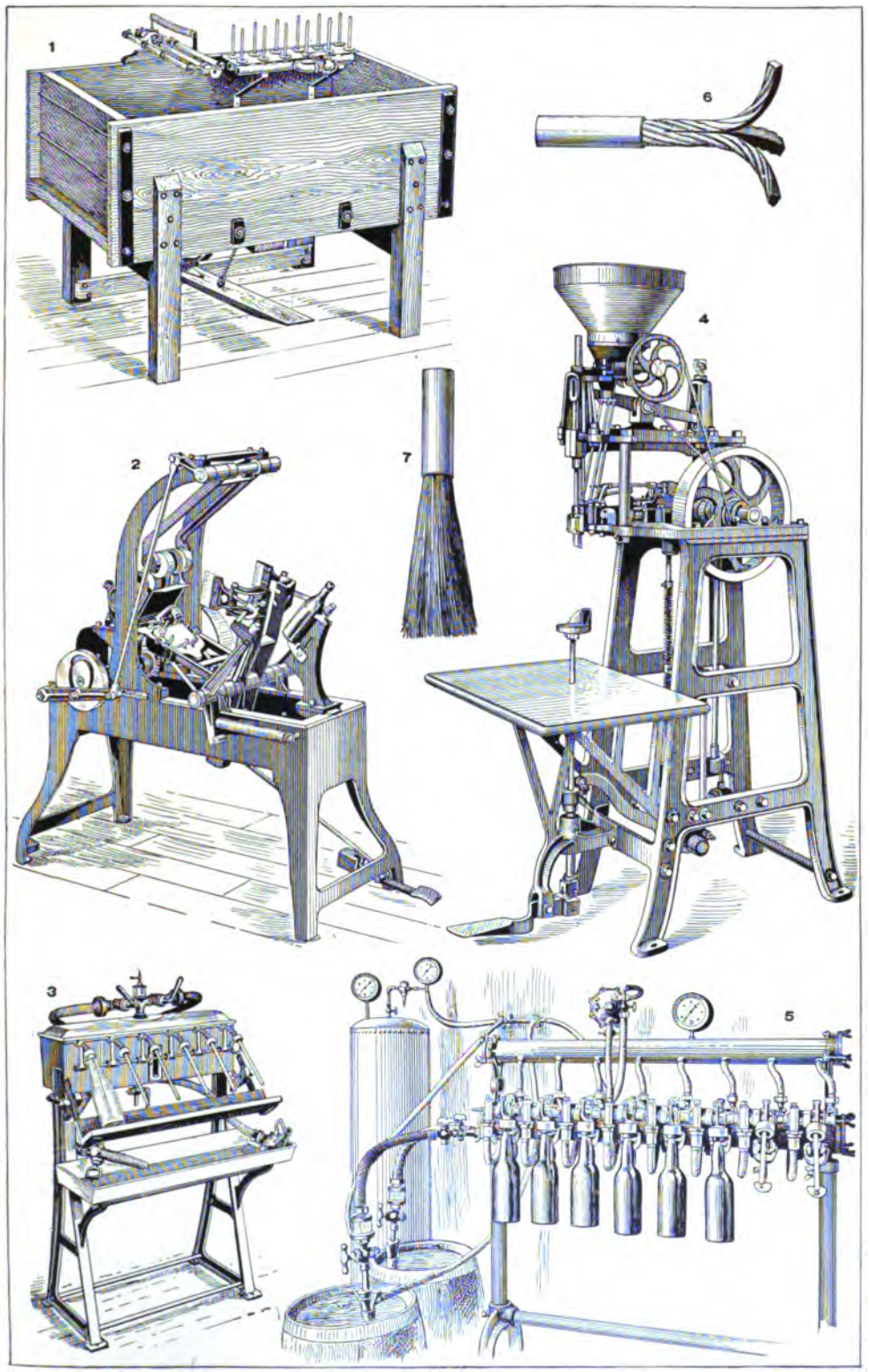
BOTTLING MACHINERY



1. BOTTLE WASHER AND RINSER.
2. BOTTLE LABELLING MACHINE.
3. FILLING MACHINE WITH SIX SIPHONS.
4. CORKING MACHINE.
5. COUNTER PRESSURE FILLER.
6. RUBBER BRUSH.
7. BRISTLE BRUSH.

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posite beverages may be mixed during the bottling process. Thus the sirup for flavored soda-water is admitted to the bottle from one receptacle and the carbonated water added from the pressure-tank.

After the bottles are filled, with the exception of the siphon bottles just described, they must be closed in some manner. The most common method is to cork them. Besides ordinary soaking and rinsing in pails or tanks of water, the corks may be placed in revolving drums and cleansed by either the wet or the dry process. In the latter process, the corks roll about in 'rumblers' and rub against each other for hours until the loose fragments and the edges that might easily chip off, together with much dust, are all removed by attrition and shaking. The corks are then thoroughly soaked and rinsed.

The essential feature of corking-machines is a compressor, which shapes the cylindrical corks used in power-corkers, and a plunger-rod, which forces each cork home into the neck of the bottle. The machine may be driven by hand, foot, or other power. The self-feeding machines may be operated at the rate of 2000 bottles per hour. Bottle-wiring machines secure the wire around the corks and necks of bottles at the rate of from several hundred to 1000 per hour, according to the dexterity of the operator. Bottle-labeling machines affix labels in place, and in some cases date them, at the rate of 10,000 to 12,000 bottles per day. In some machines the bottle is stationary and the label is picked up and pressed against the bottle; in others, a plunger forces the bottle against the label. The corks and bottle-necks are covered, chiefly for decoration, with tinfoil by hand, or caps by machine. Branding-machines to burn the brand into the corks consist of a heated die or stamp forced home by a lever or other pressure. Besides the well-known corks composed of the material of that name (see CORK), there are a great variety of other stoppers. Permanent stoppers are attached to the bottle by means of wires. They often consist of a metal cap, beneath which is a rubber cork or plug. The wiring may be so hinged and bent as to give a leverage to force the cork tightly into the bottle and hold it securely in place. When the chief function of stoppers is to cover a bottle for a brief period, pasteboard disks are sometimes used. They are particularly well adapted to the wide-mouthed bottles in which milk is delivered for final consumption. Millions of these are now made from wood pulp. See PAPER.

BOTTOM (AS. *botm*, Ger. *Boden*, Lat. *fundus*, ground, bottom). A term used to designate either the whole ship, itself, or that part of it which is under water when laden. Commodities are often said to be imported 'in foreign bottoms,' or in 'American bottoms'; in which cases the phrase is applied to the whole ship. A 'full ship,' or a 'full bottom,' denotes such a form given to the lower half of the hull as to allow the stowage of a large amount of merchandise. A 'sharp ship,' or a 'sharp bottom,' implies a capacity for speed.

BOTTOM HEAT. The heat communicated to certain soils from below, either by the fermentation of fresh stable manure, tan-bark, leaves, etc., buried for the purpose, or by steam-pipes, flues, or other like arrangements. It is one of the most important agents used in forcing-houses and hotbeds in the artificial cultivation of vegetables, flowers, or fruits.

BOTTOM, NICK. In Shakespeare's *Midsummer Night's Dream*, an ignorant and conceited weaver. In the play of "Pyramus and Thisbe," he takes the rôle of Pyramus. Puck gives him an ass's head, and Titania is compelled by the fairy king to be enamored of him.

BOTTOMRY BOND or **CONTRACT** (for derivation, see *bottom*). An agreement for a definite period of time or for a voyage by the owner or master of a ship, pledging the ship or the ship and its freight or cargo as security for the repayment of money lent for the use of the ship. It is so called because a ship's bottom or keel is figuratively used to express the whole of it. When the cargo alone is pledged for its safe arrival, the agreement is strictly called a *respondentia bond* (q.v.). The loan is made upon a maritime risk, i.e. upon the condition that the loan or debit, *together with the stipulated interest*, is repayable only on the safe termination of the voyage; otherwise the lender loses his debt. In consideration of the hazard, he may exact any rate of interest, not grossly extortionate, which the nature of the adventure may justify. The agreement is usually in the form of a bond, and must set forth all the necessary terms, especially the maritime risk. The owner may hypothecate the vessel or its freight, and execute a bottomry bond at any time and for any purpose; but the master can do so only under stress of necessity in a foreign port, destitute of funds and unable to communicate with, or to receive instruction from, the owners.

Contrary to the rule of ordinary mortgages, preference among bottomry bonds is not had according to order of date, but inversely, the latest having priority, on the theory that the last loan saved the ship. The United States statute which provides for the recording, in the office of the collector of customs of the port, of registry or enrollment, bills of sale, mortgages, hypothecations, and conveyance of vessels, under penalty of their being otherwise invalid as against others than parties having actual notice, and the grantor or mortgagor, his heirs and devisees, expressly except the lien of a bottomry bond from the operation where such lien has been created by loan of money or materials necessary to repair the vessel or to enable her to prosecute the voyage, so that the lien does not lose its priority and is not affected in any way by the requirements of the act. A bottomry bond is, however, subordinate to the lien of the seamen for wages, even though in some cases given after the wages were earned, and to liens for repairs or supplies indispensable for the safety of the ship. Where the holder is compelled to satisfy a lien for wages, it seems that he is entitled to compensation from the owners, and has a lien upon the proceeds of the ship for reimbursement. See ADMIRALTY; MARITIME LAW; and the authorities there referred to.

BOTTONY. See BOTONÉ.

BOTTS, JOHN MINOR (1802-69). An American lawyer and politician, born in Virginia. He served several terms in the Virginia Legislature after 1833, and in 1839 was chosen to Congress, where he served three terms (1839-43 and 1847-49), and where he was conspicuous

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as an advocate of a protective tariff, of a national bank, and of the repeal of the gag rules (q.v.). When President Tyler left the party that elected him, Botts separated from and antagonized him, although a warm personal friend. He opposed secession, and was faithful to the Union through the Civil War. He published *The Great Rebellion: Its Secret History* (New York, 1866).

BOTURINI BENADUCI, bō'tōō-rē'nē bā'nâ-dōō'chē, LORENZO (c.1702- ?). An Italian historian, and one of the first great collectors of American antiquities. He went to Mexico in 1736, and gathered a very large collection of aboriginal writings and other records, which eventually passed into the archives of the Mexican Government, where most of them were lost or destroyed. Boturini returned to Spain, and was appointed historiographer for the Indies in 1745. He included a valuable catalogue of his collections in his only published work, *Idea de una nueva historia de America* (1746).

BOTZARIS, bō-tsä'rēs, MARCO. See BOZZARIS, MARCO.

BOUAYANAN, bō'wâ-yâ-nän'. A wild Malay people, inhabiting the central Palawan Islands. See PHILIPPINES.

BOUCHAIN, bōō'shän' (anciently Lat. *Luccinium;* the first part of the name was probably taken from Baudouin, or Baldwin, IV., who fortified the town). A fortified town in the Department of Nord, France, 12 miles southeast of Douai, situated on an eminence about 300 feet above the sea-level (Map: France, K 1). By two sluices the adjacent land may be laid under water in time of war. There are beet-root sugar refineries, dye-works, and tanyards at Bouchain, which has also a considerable trade in cattle. Population, in 1896, 1527.

BOUCHARD, bōō'shär', CHARLES JACQUES (1837—). A French physician, born in Montier-en-Der (Haute-Marne). He was educated in Lyons, and subsequently went to Paris, where he was appointed professor of pathology in 1879. He was one of the physicians sent to the International Congress of the Medical Sciences, held in Berlin, in August, 1890, and took a prominent part in the deliberations of that body. Among his principal works may be mentioned: *Des Dégénerations secondaires de la moelle épinière* (1866); *Sur quelques points de la pathogénie des hemorrhagies cérébrales* (1867); *De la pathogénie des hemorrhagies* (1869).

BOUCHARDON, bōō'shär'dōN', EDME (1698-1762). A French sculptor, born in Chaumont (Haute-Marne). He was a pupil of Coustou the younger, and afterwards studied in Rome, where he executed a bust of Pope Clement XII., and a copy (Munich Gallery) of the "Barberini Faun." His most celebrated works were the "Fountain of Grenelle" (Paris) and the equestrian statue of Louis XV. (Tuileries Garden), destroyed in 1792.

BOUCHER, bōō'shâ', ALFRED (1850—). A French sculptor, born in Bouy-sur-Orvin. He was a pupil of Dumont and Paul Dubois, and received twice in succession the Grand Prix de Rome (1876 and 1878); but the Academy annulled one of the decisions. In 1880 the Government bought his two statues, "Vénus Astarté" and "Au but" ("At the End"), now in the Gardens of the Luxembourg. The decision and force of Boucher's work make him an artist to be remembered. Among his best statues are: "Eve après sa faute," 1878 ("Eve after the Fall"); "La terre" ("The Earth"); "Aux champs," 1897 ("In the Fields"); and "A Sleeping Woman," in the Luxembourg Museum.

BOUCHER, FRANÇOIS (1703-70). A French painter, born in Paris. He was a pupil of Lemoine, but formed his style rather after the model of Watteau; went to Rome in 1725, and after his return speedily won a great reputation. He became a member of the Academy in 1734, and its director in 1765, when he was also appointed first painter to the King. He was an artist of prodigious facility and indefatigable industry; was endowed with a brilliant imagination, and painted everything, from religious subjects and mythological and pastoral scenes to still life, from portraits, landscapes, and animals to decorations for the opera. His works are the true mirror of his time, when libertinism reigned supreme, and voluptuousness was the keynote of the Court and aristocratic society. Pastoral scenes were his favorite subjects, painted with a spirited touch and a freshness and transparency of color resembling that of Rubens, but all pervaded by that atmosphere of sensuality which emanated from the boudoirs of Madame de Pompadour and Madame du Barry. His figures of children alone conveyed a sense of purity. To the end of his days he was celebrated as the "Painter of the Graces," and also styled the 'Anacreon of Painting.' He was in high favor with Madame de Pompadour, whose portrait he painted, and who engraved some of his works. Among his numerous productions may be mentioned: "Rinaldo and Armida," "Diana Leaving the Bath," "Venus Demanding of Vulcan Arms for Æneas," "Jupiter and Callisto," "Rape of Europa," all in the Louvre; "Leda and the Swan," "Triumph of Galatea," "Toilet of Venus," in the Stockholm Museum. Among his portraits, that of Madame de Pompadour is the most famous.

BOUCHER, bou'chēr, JONATHAN (1738-1804). A British-American clergyman, prominent as a Loyalist at the time of the Revolutionary War. He was born in Blencow, England; emigrated to America in 1759; conducted a boarding-school in Virginia; was ordained a priest in 1762, and was a rector in Virginia and Maryland until 1775. He was then driven from his pulpit on account of his opposition to the principles of the Revolution, and returned to England, where from 1776 until his death he was Vicar of Epsom. He wrote many essays and papers on political and theological subjects, but is chiefly remembered for his *View of the Causes and Consequences of the American Revolution* (1797)—a collection of fifteen discourses delivered in Virginia and Maryland between the years 1763 and 1775. Of this book Professor Tyler has said: "Nowhere else, probably, can be found so comprehensive, so able, and so authentic a presentation of the deeper principles and motives of the American Loyalists, particularly from the standpoint of a High-Church clergyman of great purity and steadfastness of character, of great moral courage, of great learning, finally of great love for the country

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thus torn and distracted by fratricidal disagreements." The book was dedicated to Washington, between whom and Boucher there existed for many years an intimate friendship. *A Glossary of Archaic and Provincial Words*, an unfinished work, was published in London, in two parts, in 1832-33. Extracts from Boucher's *Autobiography* were published in *Notes and Queries*, 5th series, Vol. VI. (1850), and the "Letters of Jonathan Boucher to George Washington," in the *New England Historical and Genealogical Register*, Vol. LII. (Boston, 1898). Consult Tyler, *Literary History of the American Revolution* (New York, 1897).

BOUCHER, bōō'shâ', PIERRE, Sieur de Boucherville (1622-1717). A French pioneer, who came to America in 1635, and was engaged in the wars with the Iroquois. He was sent by the Colony of New France as deputy to France in 1661, about which time he published his *Histoire véritable et naturelle des mœurs et des productions de la Nouvelle France* (1663). He was ennobled and appointed Governor of Three Rivers. Shortly before his death he addressed to his children *The Adieux of Grandfather Boucher*.

BOUCHER DE CRÈVECŒUR DE PERTHES, de krĕv'kĕr' de pârt', JACQUES (1788-1868). A French archæologist. He was employed by Napoleon in several diplomatic missions to Italy, Germany, and Austria, and after the Restoration was most active as president of the Society of Emulation at Abbeville. He collected Roman and Celtic antiquities, which he presented to the Government, and gained much celebrity by archæological discoveries and by his work *De la création* (1839-41). Even more noteworthy are *Antiquités celtiques et antédiluviennes* (1847-65) and *De l'homme antédiluvien et de ses œuvres* (1860).

BOUCHER-DESNOYERS, bōō'shâ'dâ'nwä'yâ', AUGUSTE GASPARD LOUIS, Baron. See DESNOYERS, AUGUSTE GASPARD LOUIS BOUCHER, Baron.

BOUCHES-DU-RHÔNE, bōōsh' dụ-rōn' (Fr., Mouths of the Rhône). A southeastern department of France, bordering on the Mediterranean, formerly a part of Provence (Map: France, L 8). Area, 1971 square miles. Population, in 1896, 679,646; in 1901, 737,112. About one-half of the department is under cultivation; heaths, woods, wastes, and water occupy the other half. The Rhone—which between Arles and the sea separates into several branches, forming a delta called Ile de la Camargue—and its affluent, the Durance, are the principal rivers. The department is intersected by several canals of importance. The Ile de la Camargue produces corn and rice, and affords pasture for large numbers of sheep and cattle. The vine, olive, and mulberry also thrive there, and timber is plentiful. Marble, limestone, gypsum, and lignite are the chief mineral products. Capital, Marseilles.

BOUCICAULT, bōō'sê-kō, DION (1822-90). An Irish-American playwright and actor, born in Dublin, of French parentage, December 26, 1822. He was brought up under the guardianship of Dr. Dionysius Lardner, after whom he was named, and was educated at University College, London. His first dramatic work, produced before he was 19 years old, was *London Assurance*, Covent Garden, in March, 1841. Its signal success determined his career. It has ever since remained a favorite with British and American play-goers. The plot was slight, but ingenious; it abounded in comic situations; the dialogue was brisk and sprightly; there was no lack of wit, and there were perhaps more than enough of those flippancies and pleasant impertinences which average theatre-goers prefer to wit. Boucicault next produced, in rapid succession, *Old Heads and Young Hearts; Love in a Maze; Used Up; Louis XI.;* and *The Corsican Brothers*. When he went upon the stage, in 1852, he added the vogue of an actor to the reputation he had previously gained as an author. From 1853 till 1860 he was in America, where his popularity was scarcely less than it had been in England. On his return to London in 1860, he produced at the Adelphi Theatre a play, *The Colleen Bawn*, which proved among the most successful of modern times, and which, if not the first of a new school, has at least supplied a new descriptive name to our dramatic literature. The author made a fortune by it. It has been performed in almost every theatre in the United Kingdom; it had a great run in America; it was even translated into French, and brought out at the Ambigu Theatre in Paris. Boucicault subsequently produced at the Adelphi —of which he was for some time joint manager —another 'sensation' drama, *The Octoroon*, the popularity of which was only a little less than that of *The Colleen Bawn*. In 1862 he opened a new theatre in London, the Westminster; but this speculation turned out unfortunately. He afterwards reëstablished his fortunes by new plays, in some of which he and his wife—formerly Miss Robertson, a very popular actress—took the leading parts. *The Streets of London, Flying Scud, After Dark*, and *The Shaughraun* were among the most popular of his later works, all of which are of the type with which he had familiarized the public. His character of Con in *The Shaughraun* was perhaps his most effective and amusing creation. In collaboration with Charles Reade he wrote the novel *Foul Play*, which was afterwards dramatized. In all he wrote more than 300 dramatic pieces; and in illustration of the facility with which he composed works which—all deductions made—are of considerable merit, it may be said that he once even wrote to a royal commission that he would undertake to write plays for all the theatres in London. As an actor, Boucicault was always very popular, without attaining to high excellence in his vocation. His lack of marked histrionic talent was, in part at least, made up by his keen sense of humor; and whatever his artistic ability may have been, it is certain that he was immensely popular with his audiences. In 1876 he took up his residence in New York, where he died, September 18, 1890. Consult Clement Scott, *The Drama of Yesterday and To-day* (London, 1899).

BOUCICAULT, Mrs. DION. An English actress. As Agnes Robertson she had already made a reputation in Taylor's *Our Clerks* and other comedies at the Princess's Theatre, London, when, in 1853, she became the wife of Dion Boucicault (q.v.), and accompanied him to America. Returning in 1860 to London, she played successively at the Adelphi, Drury Lane, and other theatres, taking leading parts in several of her husband's dramas, notably as Eily

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O'Connor in *The Colleen Bawn* (1860), Zoe in *The Octoroon* (1861), and Jane Learoyd in *The Long Strike* (1866). For a time she again lived in America, but in her later life was separated from her husband.

BOUDINOT, bōō'dē-nŏt, ELIAS (1740-1821). An American philanthropist, first president of the American Bible Society, born in Philadelphia, Pa. He studied law, was admitted to the New Jersey bar, and was in 1777 appointed by Congress Commissary-General of Prisoners. In 1777-79, and again in 1781-84, he was delegate from New Jersey to the Continental Congress, of which he was in 1782 elected president. In the latter capacity he signed the ratification of the definitive Treaty of Peace with Great Britain. In 1789-95 he was a member of the First, Second, and Third Congresses of the United States, and from 1795 to 1805 was Director of the Mint at Philadelphia. He assisted in 1816 in founding the American Bible Society, whose first president he became. He aided also in the education of Indians and deaf-mutes, in the relief of the condition of the poor, and in the preparation of youth for the ministry. His publications include: *The Age of Revelation* (1790), a reply to Thomas Paine's *Age of Reason*, and *Star in the West: or, An Attempt to Discover the Long-lost Tribes of Israel* (1816), in which, with an extensive array of evidence, he supports the theory of James Adair, that the North American Indians are the lost tribes in question. Consult Boudinot, *Life of Elias Boudinot* (1896).

BOUDINOT, ELIAS (? -1839). The name taken, with Dr. Boudinot's permission, by a Cherokee Indian in the missionary school at Cornwall, Conn., where he married a white lady of the village. *An Address to the Whites* on behalf of his nation, delivered May 25, 1825, in Philadelphia, was published in 1826. He edited the *Cherokee Phœnix* (1828-34), and was a man of talent and influence in his nation. Being, with others, persuaded to make a treaty with the United States in December, 1835, for the expatriation of the Cherokees, he was accused of having sold his country, and was killed by the John Ross party, June 10, west of the Mississippi. His son, ELIAS CORNELIUS BOUDINOT (1835-90), was educated in New England and became a well-known lawyer, a lieutenant-colonel in the Confederate Army, and a delegate from his nation to the Second and Third Confederate Congresses.

BOUFFARIK, bōō'fä-rēk' (the 'Hanging Well'). A town in the Department of Algiers, Algeria, 21 miles southwest of Algiers by rail. Originally called Medina Clausel, after Marshal Clausel, who platted the town on the site of an intrenched camp of 1835, it has a thoroughly French aspect. It is the centre of a rich agricultural district, is an important market-town, and has manufactures of cotton goods and perfumes. Population, in 1901, of town, 5243; of commune, 9284.

BOUFFLERS, bōō'flâr', LOUIS FRANÇOIS, Duke de (1644-1711). A marshal of France. He was descended from one of the oldest noble families of Picardy. He began his military career as a lieutenant, and rose very rapidly in rank. Under the great Condé, Turenne, Créqui, Luxembourg, and Catinat, he fought with distinction in Germany, the Netherlands, and on the Spanish frontiers. His defenses of Namur in 1695 and of Lille in 1708 are famous. The siege of the former place, conducted by William III., cost the Allies more than 20,000 men; and although Louis XIV. sent to Boufflers an order written by his own hand for the surrender of the place, he did not surrender it until all the means of defense were exhausted. After the defeat of Malplaquet (September 11, 1709), due to the incapacity of the French commander-in-chief, Marshal Villars, he led the French Army so admirably that the retreat seemed rather a triumph than the result of a lost battle. He was a man of highly honorable and upright character. Consult La Rue, *Oraison funèbre* (Paris, 1712).

BOUFFLERS, STANISLAS, Marquis de (1738-1815). A French wit and author, commonly styled the Chevalier de Boufflers. He was born in Nancy and trained for the Church; but, dissatisfied with the clerical profession, the young abbé entered the military service of France, and was made Governor of Senegal in 1785. He was a member of the Constituent Assembly in 1789. He emigrated in 1792, and was well received at the Court of Frederick William II. of Prussia. Returning to France in 1800, he resumed his old place of Academician, and continued a devoted adherent of light literature till his death, in January, 1815. Boufflers was celebrated in his day as a master of that delicate, charming, and meaningless verse which every gentleman in France and England deemed it necessary to be able to write at that time. He was a brilliant conversationalist, and a fine wit; a friend of Voltaire's, a romancer, and a *débauché* after a gentlemanly fashion. The monument on his grave bears the following inscription, dictated by himself: *Mes amis, croyez que je dors* (My friends, believe that I sleep). His best-known work is the story *Aline, reine de Golconde*. A collection of his works was published after his death (8 vols., Paris, 1815). Consult: Uzanne, *Notice sur la vie de Boufflers* (Paris, 1886); and his *Lettres de Boufflers*, published in Paris in 1875.

BOUGAINVILLE, bōō'găn'vêl' (after the navigator Bougainville). The largest of the Solomon Islands (q.v.) under German control in the Pacific, situated in about latitude 6° S. and longitude 155° E. (Map: Australasia, H 3). Area, 3000 square miles. It is well wooded and densely populated. It contains two active volcanoes, Mount Balbi rising to over 10,000 feet above the sea. Bougainville Strait separates it from Choiseul Island on the southeast. The name Bougainville is also applied to a strait in the New Hebrides group between the island of Marina and Mallicolo, a cape on the northwest coast of Australia, and a cape on the south coast of New Ireland.

BOUGAINVILLE, LOUIS ANTOINE DE (1729-1811). A French soldier and navigator, born in Paris. He studied law, was admitted as an advocate before the Parlement, and published a *Traité du calcul intégral* (2 vols., 1754-56). Having subsequently entered the army, he was in 1756 appointed aide-de-camp to the Marquis de Montcalm in Canada. He presented the terms of capitulation at the fall of Oswego (1756), was dispatched to Montreal with news of the victory at Fort William Henry (1758), and was slightly wounded at the capture of

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Ticonderoga (1758). In the autumn of 1758 he went with Doreil to France to request supplies and reinforcements. During the siege of Quebec (1759) he was stationed with 1500 troops at Cap Rouge, there to watch the movements of the English squadron under Admiral Holmes. With the rank of colonel he left the army in 1763, entered the navy, and was authorized by the Government to establish a French colony in the Falkland Islands (Iles Malouines). In 1766-69 he circumnavigated the globe. Through the scientific and geographical discoveries of this voyage he won for the nation a glory not unlike that obtained by Cook for England in a similar expedition. When, in 1778, France came to the assistance of the United States in the Revolutionary War, he was appointed to the command of a ship of the line, took a distinguished part in the battle between De Grasse and Admiral Rodney, and rose to the rank of *chef d'escadre*. He subsequently reëntered the army as a brigadier-general, but retired in 1790, and later became a Senator and Count of the Empire. The *Journal* kept by him during his service in Canada is highly praised by the historian Parkman; he also wrote *Voyage autour du monde*, 2 vols. (1771-72). Consult Parkman, *Montcalm and Wolfe* (Boston, 1884).

BOUGH, bou, SAMUEL (1822-78). A Scottish landscape painter, born in Carlisle. He was entirely self-taught. In 1845 he obtained a position as a scene-painter in Manchester; but several years later he began to devote himself almost entirely to landscape painting. His most celebrated picture is "Shipping at Dumbarton." Among his other productions, nearly all of which are characterized by great breadth, freedom, and boldness of execution, the following are especially noteworthy: "Canty Bay," "London from Shooter's Hill," "Bannockburn and the Carse of Stirling," "Guildford Bridge," "Winton Castle."

BOUGHT AND SOLD NOTES. The written statements of a transaction of purchase and sale, which are delivered to the principals by the broker who conducted it. The copy delivered to the seller is the sold note; that which he delivers to the buyer is called the bought note. In the United States, brokers' bought and sold notes have not been a source of much litigation. Their object is to inform the buyer and seller of the fact and of the terms of the contract, and at times also to satisfy the requirements of the Statute of Frauds (q.v.). No particular form of words is necessary to a valid bought or sold note. Perhaps the most complete form of a sold note is the following: "Sold for A B to C D 1000 bushels of Early Rose potatoes, now in A B's cellar, for $300 cash, to be paid on delivery at C D's warehouse, within one week from date." Dated, and signed by the broker. The bought note would begin, "Bought from A B for C D," but otherwise it would contain the same language as the sold note. For other forms of bought and sold notes, and for the various legal rules deducible from the English decisions relating to them, see Benjamin, *Treatise on the Law of Sale of Personal Property* (7th American ed., by Bennet, Jersey City, 1889), and Campbell, *Law Relating to the Sale of Goods and Commercial Agency* (2d ed., London, 1891).

BOUGHTON, bą'ton, GEORGE H. (1833—). An English painter. He was born near Norwich. Soon after his birth his family came to America and settled at Albany, where he began to paint at a very early age. He went to Paris to study in 1860, and to live in London in 1862. His work shows a fine sense of color and much sympathy with nature. He was elected an associate of the Royal Academy in 1879, and a Royal Academician in 1896. He was made a member of the National Academy of Design, New York, in 1871. One of his early pictures, very popular in America, was the "Return of the Mayflower." Other pictures are "The Scarlet Letter," "Puritans Going to Church," "Edict of William the Testy," "The Heir Presumptive." Boughton's work is marked by much grace and refinement, and he may be mentioned as one of the most successful men who came under the influence of that charming painter of idyllic English scenes, Frederick Walker. Boughton has also written for the magazines, and illustrated his stories with taste and skill. Consult: G. W. Sheldon, *Hours with Art and Artists* (New York, 1882); Richard Muther, *The History of Modern Painting* (London, 1896).

BOUGIE, bōō'zhē', or **BOUGIAH**, bōō-jē'ä (from the tribe *Bujayah* or *Bejaia*). A fortified Mediterranean seaport on the Bay of Bougie, in the Department of Constantine, Algeria, 112 miles east of Algiers. It has a deep and well-sheltered roadstead, and an inner basin with quayage (Map: Africa, E 1). It has a trade in grain, wine, oranges, oil, and wax—the last article giving the name of the port to the 'bougie' surgical appliance, which was originally made from this local product. The town is built on the slope of Mount Guraya, which rises to a height of 2310 feet. The chief buildings are the Abd-el-Kader fort, used as a prison, and the French church. Founded by the Carthaginians, it was the Roman *Saldæ*. Genseric, King of the Vandals, who for a time made it his capital, built walls around it. In the Tenth Century it was the greatest commercial city of the north African coast, with a population of 100,000, and in the Twelfth and Thirteenth centuries Italian merchants had their own warehouses and churches there. After the successive occupation by Spain and Turkey in the Sixteenth Century, it dwindled into insignificance. Its modern rise dates from the French occupation in 1833. Population, in 1891, 12,381.

BOUGIE, bōō-zhē' (Fr., wax candle, a bougie; from the Algerian town Bougie, whence these candles were first imported). A solid rod of whalebone, gutta-percha, woven thread covered with gum elastic or other substances, used for distending contracted mucous canals, as the gullet, bowels, or urethra. (See STRICTURE.) Similar instruments made of silver, steel, or other metals are called 'sounds.' Bougies vary from a filiform to a half inch in diameter. They are cylindrical, tapering to a blunt point, or tipped with olive-pointed or conical extremities. The name is also given to rods of gelatin or cocoa butter, impregnated with medicine, which are placed in the urethra to be dissolved by degrees, as the heat of the body melts them, thus causing a continuous application of the medicine. Special medicated bougies are also made for the nasal cavity.

BOUGIVAL, bōō'zhē'vâl'. A favorite pleasure resort of Parisians in the Department of Seine-et-Oise, France, on the left bank of the

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Seine, 8 miles northwest of Paris. Its Romanesque church dates from the Twelfth Century. Population, in 1901—of town, 2189; of commune, 2584.

BOUGUER, bōō'gâ', PIERRE (1698-1758). A French mathematician and physicist, the founder of photometry. He was born at Croisic, in Bretagne, and studied in the Jesuit College at Vannes. In 1713 he succeeded his father as professor of hydrography in Croisic, whence he removed to a similar office in Havre in 1730. In 1729 he published his *Essai d'optique sur la graduation de la lumière*. In 1731 he was made associate geometer of the Academy of Sciences, and was promoted to the office of pensioned astronomer in 1735. In that year also he was chosen to proceed, along with Godin, La Condamine, and Jussieu, to South America, for the purpose of measuring a degree of the meridian at the equator. They had to contend with many difficulties, and were more than seven years away from home, during which time Bouguer made valuable observations on the length of the seconds pendulum at great elevations, the deviation of the plumb line from a vertical position through the attraction of neighboring mountains, the line of perpetual snow, etc. He published an account of his labors and those of his colleagues in a magnificent work, entitled *Théorie de la figure de la terre* (Paris, 1749). Bouguer's investigations concerning the intensity of light laid the foundation of photometry; and their results, which had been partly exhibited in the optical work already noticed, were more fully embodied in his *Traité d'optique sur la graduation de la lumière*, which was edited after his death by Lacaille (1760). He is the inventor of the heliometer (q.v.). He published an excellent *Nouveau traité de navigation et de pilotage* (1753), and numerous works in the *Mémoires de l'Académie des Sciences* (1726 to 1757).

BOUGUEREAU, bōō'grō', GUILLAUME ADOLPHE (1825—). A French painter. He was born in La Rochelle, November 30, 1825, and studied in Bordeaux under Alaux, and in Paris under Picot. Although he follows the classical line and contour, he may be called an academic realist in his treatment of the figure. As a painter of flesh he is considered preëminent by his chief admirers, but there are critics who take exception to many of his effects. For example, though he is a consummate draughtsman, he is charged with a lack of sincerity in his painting, and it is thought that his work does not suggest a faithful reference to nature. He was president of the Société des Artistes in 1885. The following works represented him in the Exposition of 1900: "Compassion," "L'Admiration," "Psyche et l'Amour," and "Portrait de Madame la Comtesse C." Consult: C. H. Stranahan, *A History of French Painting* (New York, 1899); G. W. Sheldon, *Hours with Art and Artists* (New York, 1882).

BOUILLABAISSE, bōō'yâ'bās', THE BALLAD OF. A poem of Thackeray's on the Marseilles chowder called bouillabaisse.

BOUILLÉ, bōō'yâ', FRANÇOIS CLAUDE AMOUR, Marquis de (1739-1800). A French general. He was born at the castle of Cluzel, in Auvergne, entered the army at the age of 14, and served with distinction in Germany during the Seven Years' War. He was Governor of Guadeloupe in 1761, and soon after became Governor-General of Martinique and Saint Lucia, and commander-in-chief of the French forces in the West Indies. In the war against England which broke out in 1778 he captured the islands of Dominica, Tobago, Saint Christopher's, Saint Eustatius, Saint Martin, Saba, and Nevis. For this he was rewarded with the rank of lieutenant-general. In 1784 he visited England, and was received with extraordinary respect on account of his kindly behavior to his enemies during the war just concluded. Louis XVI. nominated him a member of the Assembly of Notables in 1787-88; in 1790 he was made commander-in-chief of the army of the Meuse, the Saar, and the Moselle. His decision of character prevented the dissolution of the army and the outbreak of civil war. He quelled the insurrection of the garrison of Metz and of the three regiments at Nancy. For this he received the thanks of the National Assembly and of the King. From 1789 to 1791 Bouillé was regarded with suspicion by the Revolutionists and rumors were often spread of his joining with the Austrians to march on Paris. After Louis XVI.'s flight to Varennes, of which he declared himself the instigator, he repaired to Coblenz to the King's brothers, and in 1791 attended the conference at Pilnitz. In the same year he entered the service of Gustavus III. of Sweden, and after the assassination of that monarch served in the corps of the Prince of Condé. He rejected an offer, which the French princes made to him in 1793, of the chief command in La Vendée, and went to England, where his advice in West Indian affairs was useful to the Government; here he wrote his *Mémoires sur le révolution française*, a useful work, throwing much light on the transactions of that time. He died in London. Consult Gabriel, *Louis XVI. le marquis de Bouillé et Varennes* (Paris, 1874).

BOUILLIER, bōō'yâ', FRANCISQUE (1813—). A French philosopher, born in Lyons. He studied at the Normal School, Paris, and in 1839 was appointed professor of philosophy at the University of Lyons. From 1849 to 1864 he was dean of the faculty of Lyons, and from 1867 to 1870 director of the Normal School. His works, the best of which display both a finished style and high scholarship, include *Histoire et critique de la révolution cartésienne* (1842); *Théorie de la raison impersonnelle* (1844); *La vraie conscience* (1882); and *Souvenirs d'un vieil universitaire* (1897).

BOUILLON, bōō'yôn' (Med. Lat. *Bullonium*). An old duchy, included in the Belgian Province of Luxemburg, consisting of a woody and hilly district in the Ardennes, about 157 square miles in extent, with a population of 22,000. This duchy was the possession of the famous Crusader Godfrey of Bouillon (q.v.), who, in order to raise money for his Crusade, pledged it, in 1095, to the Bishop of Liège, from whom it passed to the Lords of Sedan. In the Seventeenth Century it became the possession, under French suzerainty, of the family of La Tour D'Auvergne. In 1793 it became a part of France. After the Napoleonic wars it belonged for a time to the King of the Netherlands, and in 1830 it was united with Belgium. The little town of Bouillon, above which towers the mediæval castle of the Dukes of Bouillon, is situated about 10 miles northeast of Sedan. Consult Ozerây, *Histoire de Bouillon* (Luxembourg, 1827).

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BOUILLON, Frédéric Maurice de la Tour d'Auvergne, Duc de (1605-52). A French general, son of Henri. He first served in Holland under Maurice of Nassau, his uncle, and entered the French service in 1635. Joining the rebellion of the Comte de Soissons against Richelieu in 1641, he defeated the royal forces at La Marfée, but, abandoned by the Spaniards, retreated to Sedan and managed to make his peace with Richelieu, whereupon he received command of the French army in Italy. Implicated in the plot of Cinq-Mars only a year afterwards, he was arrested, and was in danger of execution, but his wife had possession of Sedan and threatened to surrender the place to the Spaniards unless he should be saved. After the death of Louis XIII. he went to Rome, where he had command of the Papal forces. Returning to France in 1649, he took an active part in the war of the Fronde against Cardinal Mazarin.

BOUILLON, Godfrey de. See Godfrey of Bouillon.

BOUILLON, Henri de la Tour d'Auvergne, Duc de (1555-1623). A French general, at first known as Vicomte de Turenne. He became a Calvinist and partisan of Henry of Navarre, who, when King, gave him the hand and estate of Charlotte de La Marck, the heiress of the Duchy of Bouillon. On the night in which he was to be married, he suddenly left his prospective bride, and stormed the fortress of Stenay, then held by the Army of Lorraine. Soon afterwards he was made marshal of France, and intrusted with two diplomatic missions to England, Holland, and Germany. Compromised in the Biron conspiracy, he was obliged to take refuge in Geneva in 1603, but became reconciled to the King in 1606. After the assassination of Henry IV., he was one of the Council of the Regency, and was alternately for and against the Queen. The Assembly of La Rochelle appointed him general-in-chief of the Reformed forces, but he refused the appointment and retired to Sedan, where he established a college and valuable library. His second wife, a daughter of William, Prince of Orange, left him two sons, the younger of whom was the celebrated Marshal Turenne.

BOUILLY, bōō'yē', Jean Nicolas (1763-1842). A French dramatist. During the Revolutionary period he was first a judge, then a public prosecutor in Tours, and later he was called to Paris to aid in the establishment of primary schools throughout France. He retired from public life in 1799. The sentimental character of most of his works earned for him the name of 'poète lacrymal.' The most noteworthy among them are: *Pierre le Grand*, a comic opera, for which Grétry wrote the music; *L'Abbé de l'épée; Les deux journées*, set to music by Cherubini; *Fanchon;* and *Madame de Sévigné*. Of his writings for the young, the *Contes efferts aux enfants de France*, *Contes à ma fille*, and *Conseils à ma fille* (1809), have passed through several editions, and have been translated into several languages.

BOULAINVILLIERS, bōō'lăn'vē'yā', Henri, Comte de (1658-1722). A French historian, born at Saint Saire, Normandy. He studied for a time and entered the military profession, but soon devoted himself exclusively to the investigation of the genealogy of the ancient families of France. He regarded the feudal system as the most perfect form of human government, and his writings are pervaded by extreme aristocratic sentiments. They were published after his death. The most valuable of them are his *Histoire de l'ancien gouvernement de France* (1727); *L'état de la France* (1727); *Histoire de la pairie de France et du parlement de Paris* (1753); and his *Abrégé chronologique de l'histoire de France* (3 vols., 1733).

BOULANGER, bōō'lăn'zhā', Georges Ernest Jean Marie (1837-91). A French general. He was born at Rennes, and educated at Saint Cyr. He served in Italy and China, was with Bazaine at Metz, but escaped to Paris, and held a lieutenant-colonelcy under the Government of National Defense. In 1881 he headed the deputation of French officers at the celebration of the centenary of the battle of Yorktown; he became brigadier-general through the influence of the Duc d'Aumale, and in 1884-85 commanded the army of occupation in Tunis. He was Minister of War from January, 1886, to May, 1887, and through the introduction of some desirable army reforms, and the appearance of a popular music-hall song in his praise, was adopted as the embodiment of the 'revenge' policy by the Parisians. In 1887, while commanding an army corps, he was arrested for remarks on the acting War Minister, and in March, 1888, for disobedience to orders, was deprived of his command and placed on the retired list. Supported by a combination of malcontents of all parties, chief among them the Orleanists, he aroused for a time that reckless popular enthusiasm which is so easily stirred in France by a little bravado. For a brief period the 'man on horseback' fixed the attention of all observers, and aroused some fear as to the safety of the Republic. In 1888 and 1889 he was elected deputy from a number of departments. A coup d'état was momentarily expected; but Boulanger's courage was not equal to his ambition. When the danger of prosecution by the Tirard Ministry for conspiracy seemed imminent he fled to Brussels. He was convicted of malfeasance by the Senate. Politically discredited, he finally took up his residence in the island of Jersey. In 1890 one of his former adherents, M. Mermeix, published in the Paris *Figaro* a series of revelations concerning the inner history of the Boulangist movement, under the title *Les coulisses de Boulangisme*, furnishing conclusive evidence that Boulanger was a tool in the hands of the Royalists. The funds, amounting to 3,000,000 francs, for his propaganda, were furnished by a Royalist noblewoman, the Duchesse d'Uzès. Boulanger committed suicide at Brussels, September 30, 1891, on the grave of Madame Bonnemain, his mistress. Consult pamphlets and broadsides of the time, articles in the periodical press and the following: Chincholle, *Le Général Boulanger* (Paris, 1889); Guyot, *Le Boulangisme* (Paris, 1889); Turner, *General Boulanger: A Biography* (London, 1889); Verly, *Le Général Boulanger et la conspiration monarchique* (Paris, 1893); De Vermont, *Les coulisses de Boulangisme revues et augmentées de plusieurs chapitres inédits* (Paris, 1890).

BOULANGER, Gustave Rodolphe Clarence (1824-88). A French painter, whose subjects are mainly Oriental, after the manner of Gérôme. He was born April 25, 1824, at Paris, and studied under Delaroche and Jollivet. He took the

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Prix de Rome in 1849, and was made a member of the Institute in 1882. He died in Paris, September 22, 1888. He was a constant exhibitor at the Salon, and in 1869 was represented by the "Street of the Tombs at Pompeii," and in 1874 by the "Appian Way in the Time of Augustus," afterwards in the collection of A. T. Stewart. Consult C. H. Stranahan, *A History of French Painting* (New York, 1899).

BOULANGER, Louis (1806-67). A French painter, born at Vercelli (Piedmont). He was a pupil of Guillon-Lethière and Dévéria, and from 1860 was director of the School of Fine Arts at Dijon. He first attracted attention in 1827 with his "Mazeppa" (Rouen Museum). His other works include: "Spanish Mule-Drivers" (1833), many excellent water-colors, chiefly in series depicting scenes from *Notre Dame de Paris*, *Othello*, *King Lear*; "The Triumph of Petrarch" (1836); "Macbeth" (1859); and "Concert in Picardy" (1866). He illustrated many of Hugo's works.

BOULAY DE LA MEURTHE, bōō'lā' de lā mērt', Antoine, Count (1761-1840). A French statesman, born at Chaumouzey in the Vosges, the son of a peasant. He espoused the cause of the Revolution, but held moderate views, and in the Council of Five Hundred opposed both Jacobinism and the despotism of the Directory. Under the Empire he took an important part in the preparation of the *Code Civil*, and afterwards labored with zeal in the administration of the national domains. Napoleon created him Count in 1813. After the Second Restoration he was banished to Nancy, whence the Russians carried him off into Germany. He was kept under surveillance at Halberstadt, and then at Frankfort until 1819, when he returned to France and lived in retirement at Paris. His *Essai sur les causes qui en 1649 amenèrent en Angleterre l'établissement de la république* (1799) had a wide circulation, and considerably influenced the French mind in favor of the coup d'état of the 18th Brumaire. Of his other numerous political writings the most important is *Tableau politique des règnes de Charles II. et de Jacques II.* (1888). In conjunction with others he wrote *Bourrienne et ses erreurs volontaires et involontaires* (1830), valuable regarding the history of Napoleon.

His son, Henri Boulay de la Meurthe (1797-1858), born in Paris, took an active part in the Revolution of 1830, but became an opponent of the Government of Louis Philippe. He devoted great attention to questions of social economy, contributing much to promote the establishment of houses of refuge (*salles d'asile*), the extension of elementary education, and many improvements in the condition of the laboring classes. In the National Assembly of 1848, he associated himself with the moderate Republicans, and in January, 1849, was elected vice-president of the Republic. Nevertheless, he tacitly acquiesced in the coup d'état of December, 1851, and became a member of the new Senate.

BOULDER, bōl'dēr. A city and the county-seat of Boulder County, Col., 28 miles northwest of Denver; on the Union Pacific, the Colorado and Southern, and other railroads (Map: Colorado, E 2). It has a public library, and is the seat of the State University, established in 1877, and of the Colorado Chautauqua. There is a public park of 1800 acres, and among other attractions of the vicinity are the famous Boulder Cañon, and the gold, silver, and telluride mines of Sunshine, Salina, Gold Hill, and Jamestown. Boulder is noted as a summer and health resort, medicinal springs being but a few miles distant and the Colorado Sanitarium in the city. It is in an agricultural and stock-raising, as well as a mining region, and has flour-mills, large smelting and sampling works, lumber-mills, etc. Recently, considerable excitement has centred in the discovery of oil, a large number of wells having been drilled within a radius of two miles of the city. Chartered as a city in 1871, Boulder is now governed under a charter of 1882, which provides for a mayor, elected biennially, and a city council. The water-works are owned and operated by the municipality. Population, in 1890, 3330; in 1900, 6150.

BOULDER (origin obscure, usually compared with Sw. *bullersteen*, a large rolling stone, so called from the noise with which it rolls, from *bullaa*, to thunder, roar), Erratic. A large mass of rock of rounded form found at a distance from the formation to which it belongs, and lying detached on the surface or imbedded in the superficial deposits. Boulders originate, chiefly, either in corrosion by torrential waters or in erosion with solution along joint planes of rock, and owe their present distribution to torrential waters, glacial ice, and icebergs. Boulders often furnish most beautifully preserved fossils, which cannot be collected from the more coherent portions of the parent ledge. From their magnitude and number, they frequently give a striking expression to the landscape of the northern portion of the United States, especially in New England and Wisconsin. One at Nottingham, N. H., is estimated to weigh 6000 tons; another at Whitingham, Vt., weighs about 3000 tons. Large blocks of Scandinavian rock are scattered over the plains of Denmark, Prussia, and Northern Germany. The pedestal of the statue of Peter the Great, in Saint Petersburg, was hewn out of a large erratic boulder, 1500 tons in weight, that lay on a marshy plain near that city. See Boulder Clay; Glacier; Iceberg; Glacial Period; Geology.

BOULDER CLAY. A term applied to a deposit of compact blue or red clay occurring in the glacial drift, and having boulders diffused throughout its mass, with here and there thin lenticular beds of gravel and sand interspersed. It is found in many parts of the United States north of the terminal moraine of the Continental ice-sheet that existed in early Quaternary times. The boulders, which are the most striking feature of this bed, differ in size from small pebbles to masses many tons in weight. They are portions of rocks of all ages, more or less worn and often striated. The older rocks, when transported from a distance, are rounded, while those that have been derived from rocks in the neighboring districts are more angular. These masses are scattered without order in the clay, the heaviest blocks occurring frequently in the upper portions of the bed. The clay represents rock-flour, produced by the grinding action of glaciers, aided by the harder rock fragments held in the ice. Layers of boulder clay vary in thickness, usually diminishing with the elevation of the point at which they are found. See Glacier; Glacial Period; Quaternary Period.

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BOULE, bōō'lē (Gk. βουλή, council). In ancient Greece, a council or senate. The *boule* of the Homeric times was composed of princes or leading men, and was a purely consultative body, being convoked to assist the King in matters of public policy with information and advice. The Athenian *boule*, which was employed by Solon as a check on the *ecclesia* (ἐκκλησία), was at first composed of four hundred members, selected, not, as at a later time, by lot, but by election of the people, from the four tribes, one hundred from each tribe, and from the three upper classes. Its duties were to prepare matter for the discussion of the assembly, to convoke and superintend its meetings, and to insure the execution of its decrees. The number was increased by Cleisthenes (B.C. 508-507) to 500, fifty members being taken from each of the ten tribes into which the people were then divided; from this time its duties became more extensive, embracing matters of administration and general oversight. From early in the Fifth Century all free-born Athenian citizens above thirty years of age were eligible to membership. At a still later time (B.C. 306) the number was further increased to 600, there being now twelve tribes, but in the time of Hadrian it was again reduced to 500. See Schoemann, *Griechische Alterthümer*, 1², pp. 394 ff.; Hermann, *Griech. Staatsalterthümer*, sec. 125-127; Gilbert, *Griech. Staatsalterthümer*, 1², pp. 295 ff. (Eng. trans. pp. 265 ff.); Heydemann, *De Senatu Atheniensium* (Strassburg, 1880).

BOULENGE (bōō'länzh') **CHRONOGRAPH**. See BALLISTICS.

BOULEVARD, bōō'le-vär', *or* bōō'lē-värd (Fr., from Ger. *Bollwerk*, bulwark, bastion). A broad avenue, especially designed for promenades or driving. It was originally the rampart to a fortress or town. In France and Germany these ancient works have generally been leveled, the ditches filled up, and the space thus obtained employed for the formation of parks, promenades, and streets lined with trees. These, in France, still bear the name of boulevard. The boulevards of Paris are celebrated, and are of great service as open spaces promoting the circulation of air amidst the dense mass of habitations. Some parts of them present a bright and interesting spectacle; and as a whole, they afford a striking exhibition of the life and character of the French capital in all the different classes of society. The Boulevard des Italiens is particularly known as the rendezvous of the fashionable, and the Boulevard du Temple as the place where the small theatres are to be found which are frequented by the common people and the inhabitants of the suburbs, for which reason the expression *théâtre de boulevard* is often employed to denote a theatre for the common people, or one of an inferior kind. The Thames Embankment is essentially a boulevard. Many American cities have spent large sums of money in laying out spacious boulevards of considerable length. New York has a number of fine parkways or boulevards, especially in the boroughs of Brooklyn and Queens; and Boston and Chicago are also well supplied with these driveways.

BOULGARIS, bōōl-gär'rĕs. See BULGARIS.

BOULGER, bŭl'jĕr, GEORGE SIMONDS (1853—). An English botanist. He was born at Blechingly, Surrey, and was educated at Wellington and Epsom colleges. He was appointed professor of natural history at the Royal Agricultural College, Cirencester, in 1876, and professor of botany and geology at City of London College, in 1884. His publications include: *Familiar Trees* (1886-89); *The Uses of Plants* (1889); *Biographical Index of British and Irish Botanists* (with J. Britten, 1893); *The Country Month by Month* (with J. A. Owen, 1894-95); *Elementary Geology* (1896); *Flowers of the Field* (1900).

BOULLE, bōōl, or **BOULE** (formerly erroneously called BUHL), ANDRÉ CHARLES (1642-1732). A French cabinet-maker, born in Paris. He studied designing, engraving, and carving, and elevated cabinet-making to an art-industry by the invention of a kind of marquetry since known by his name. This work, which is very sumptuous in effect, consists in a skillful piercing and inlaying of metal, the materials used being tortoise-shell, enamel, or metals of other colors. He was patronized by Louis XIV., whose elaborate tastes this work well suited, and it continues to be valued highly by collectors. Reisner, a German contemporary of Boulle, used a ground of tulip-wood, inlaid with designs in darker woods, and varied by margins and bands of lighter color, with the grain crossed for contrast. This modification is correctly called Reisner-work. For his life, consult Asselineau (1855).

BOULLONGNE, bōō'lō'ny', or **BOULONGNE**, LOUIS DE (1654-1734). A French painter. He was one of the ten original members of the Academy of Painting, and became its president. He was first painter to the King, and was designer of medals and devices for the Academy of Inscriptions. The Gobelins tapestry for the King's apartment was made after his designs in imitation of Poussin in the great gallery of the Louvre. He was also an excellent engraver, and the few of his pictures that are known exhibit a delicate sense of line and color.

BOULOGNE-SUR-MER, bōō'lō'ny'-sur-mär' (Fr., Boulogne on the sea; anciently, *Gesoriacum*, *Bononia*). A fortified seaport in the Department of Pas-de-Calais, France (Map: France, H 1). It stands at the mouth of the river Liane, on the English Channel, 22 miles southwest of Calais, and 139 north-northwest of Paris. The city is divided into the upper and lower, or the old and new districts. The upper city was once a great stronghold, and its ramparts are now spacious boulevards, commanding a fine marine view, with the coast of England as a horizon. At the east end stands an old castle with six turrets, which dates from 1231. In this part of the city are the fine Hôtel de Ville and the Cathedral of Notre Dame, in Græco-Roman style, with a colossal statue of the Virgin surmounting the dome, which is 300 feet in height. The building was erected (1827-66) on the site of a Gothic cathedral destroyed in 1793. The lower or new town is the centre of modern trade and social life—merchants, pleasure-seekers, fishermen, and factory hands throng the streets, which are broad, clean, and bright. The beautiful sands are crowded in summer by bathers, etc., and the fine pier is a pleasant promenade. One of the chief objects of interest is the marble Column of

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the Grand Army, 176 feet high, surmounted by a bronze statue of Napoleon I., commemorating his projected invasion of England. In the lower town stand the barracks, the theatre, the museum of art, a hospital, and a library. While the industries include the manufacture of steel pens, linen thread, carriages, glass, tubes, cement, etc., the main source of wealth of Boulogne is the sea, and the oyster, herring, cod, and mackerel fisheries. Boulogne is one of the most frequented terminals of steamer routes from England, and a large English colony is found there. Population, in 1896, 46,807. Gesoriacum was a fortress of the Gallic tribe of the Morini. In the time of Constantine the place was called Bononia. Under the Carlovingians the name was changed to Bolonia. After the death of Charlemagne the Normans sacked it; it was taken by the Burgundians in 1435, and held until Louis XI. added it to the French Kingdom in 1477. It was besieged by Henry VII. of England in 1492, taken by Henry VIII. in 1544, but restored to France by Edward VI. in 1550. It was at Boulogne that Napoleon I., in 1804, assembled an army 180,000 strong for the invasion of England, which, however, was not attempted. On August 6, 1840, Louis Napoleon attempted to raise here an insurrection in his favor. He was imprisoned in the castle above mentioned.

BOULOGNE-SUR-SEINE, bōō'lō'ny'-sụr-sȧn' (Fr., Boulogne on the Seine). A town of France, in the Department of Seine, about 5 miles west of Paris, opposite Saint Cloud, on the river Seine, which is crossed at this point by a fine stone bridge. It gives its name to the Bois de Boulogne, the great park and promenade of Paris. (See PARIS.) It has extensive linen bleacheries and perfume manufactories. Population, in 1890, 37,418. The ancient name of Boulogne was Menus-les-Saint-Cloud, but in 1319 some returning pilgrims who had sailed from Palestine to Boulogne-sur-Mer erected a church in Menus and called it Notre Dame de Boulogne-sur-Seine. The church was restored in 1863.

BOULTON, bōl'ton, CHARLES ARKOLL (1841-99). A Canadian soldier and legislator. He was born at Coburg, Ontario, and served in the British Army from 1858 to 1868. During both of the insurrections in Manitoba, led by Louis Riel, he took an active part in the struggle against the rebels, was imprisoned and sentenced to death by them in 1870, and at the outbreak of the second rebellion, in 1885, organized and commanded a corps of mounted riflemen known as Boulton's Scouts. He was called to the Senate of the Dominion Parliament in 1889, and sided with the Liberal Party in that chamber. He is the author of an interesting book: *Reminiscences of the North West Rebellion* (1886).

BOULTON, MATTHEW (1728-1809). An English mechanician. When still very young, he undertook at his father's death the business of his steel manufactory, which he carried on with great energy, and extended, in 1762 founding the famous Soho works near Birmingham. One of his first inventions was a new mode of inlaying steel. He entered into partnership with James Watt (q.v.), who had obtained a patent for the great improvements in the steam-engine which have immortalized his name, and they established a manufactory of steam-engines in 1769. They jointly contributed also to the improvement of coining machinery, and so to the perfection of the coinage itself. For his biography, consult S. Smiles, *Lives of Boulton and Watt* (London, 1865).

BOU MAZA, bōō mä'zȧ, SI MOHAMMED BEN ABDALLAH (1820—). An Arab leader of Algeria, who, as a dervish, in 1845, excited the people of Dahra against the French, and, with the support probably of Abd-el-Kader (q.v.), engaged in several conflicts. Saint Arnaud made him a prisoner (1847), and sent him to Paris, where he received a pension and was provided with a home. He escaped in 1848, but was caught and sent as a prisoner to Ham, where he was kept a year and a half. He subsequently entered the Turkish Army and fought in the Crimean War.

BOUNCE, BENJAMIN. The name assumed by Henry Carey as the author of the burlesque *Chrononhotonthologos*.

BOUNCER, MR. A character in the novel *Verdant Green*, by Cuthbert Bede (the Rev. Edward Bradley).

BOUNCER, MRS. The landlady in J. M. Morton's farce *Box and Cox* (1847).

BOUNCING BET. See SOAPWORT.

BOUND, or **BOUNDARY** (OF. *bonne, bonde, bodne,* from Low Lat. *bodina, bodena,* bound, limit). The utmost limits of land by which the same is known and can be described; being in this sense synonymous with *abuttals,* which means the buttings and boundings of lands east, west, north, and south, with respect to the places by which they are limited and bounded. An adjoining parcel of land, stream, or road, named in a deed as a boundary of the land conveyed, is a monument (q.v.), and in the interpretation of the deed prevails over the courses and distances given in the description. See REAL PROPERTY, and the authorities there referred to.

BOUND, or **BOUNDE**, NICHOLAS. See BOWNDE.

BOUND BAILIFF. In England, a deputy sheriff or sheriff's officer, whose duty is to discover and arrest debtors. As the sheriff is responsible for the misconduct of these bailiffs, they are annually bound in an obligation, with sureties, for the due execution of their office, whence the name *bound* bailiffs, which Blackstone is at pains to inform us "the common people have corrupted into a much more homely appellation"—*bum-bailiff*. See BAILIFF.

BOUND BROOK. A borough in Somerset County, N. J., 30 miles west-southwest of New York, on the Raritan River, the Delaware and Raritan Canal, and the Baltimore and Ohio, the Central of New Jersey, the Lehigh Valley, and the Philadelphia and Reading railroads (Map: New Jersey, C 2). It has manufactures of woolen goods, engines, electric dynamos, gas fixtures, roofing paper and paint, graphite journal-bearings, cash-registers, and lumber. The borough contains a public library. Settled about 1700, Bound Brook was first incorporated in 1892, the date of the charter now in operation, which provides for a mayor, elected biennially, and a city council. On April 13, 1777, 4000 English and Hessians under Lord Cornwallis and Count Donop surprised here about 1000 Americans under General Lincoln, who, after a short resistance, retreated, having lost 60 men in killed,

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wounded, and prisoners. Population, in 1890, 1462; in 1900, 2622.

BOUN'DERBY. The overbearing merchant who marries Louisa Gradgrind in Dickens's *Hard Times.* He is a mill-owner and banker in Coketown, and the son of Mrs. Pegler, whom he bribes to keep her from disclosing her identity.

BOUNDING CHARTER. In the Scotch law, an instrument of title which describes the lands thereby conveyed by their boundaries or limits. It gives right to everything within the bounds, and, on the other hand, it excludes what lies beyond these. In American and English law, instruments for the conveyance of land are called *deeds,* and generally contain a description of the plot conveyed according to its metes and *bounds.* See the authorities referred to under CONVEYANCE.

BOUN'TIFUL, LADY. A character in the comedy of *The Beaux' Stratagem,* by Farquhar, distinguished for her beneficence.

BOUNTY (Fr. *bonté,* goodness, from Lat. *bonitas,* goodness, excellence, from *bonus,* good). A term applied to any sum granted by law as an inducement to some undertaking believed to be of national importance. (1) Payments of bounties are sometimes made for the encouragement of commercial or industrial enterprises. The payment contemplated is a direct one, but the term is also applied to indirect pecuniary benefits which arise through legislation. The so-called sugar bounties of Germany, for instance, consist nominally in an abatement of internal taxes upon exported sugar. But as the abatement is so measured that it is greater than the original tax, it constitutes in fact, if not in name, a bounty upon exportation. For a discussion of industrial bounties, see FREE TRADE; SUBSIDIES.

(2) Monetary inducements to encourage men to join the army, or extend their service, are common. Usually bounty is only given in those countries whose armies are recruited by voluntary enlistment. The amount given varies with the need and difficulty of procuring recruits. During the Civil War in the United States, as much as $1000 was sometimes offered for enlistment. This was, however, owing to the magnitude of the war and the immense number of men required. The English Government gives a bounty to men already serving in India to induce them to extend such service.

(3) In the United States Navy, money is awarded a ship which sinks or destroys an enemy's ship of war. When the vessel destroyed is of equal or superior force the victors are awarded $200 for each person on board the enemy's ships at the beginning of the engagement; if of inferior force, $100 for each person. If the ship is destroyed after the capture, for public interest, $50 is awarded for each person on board the ship at the time of capture. The amount awarded is divided among the officers and crew in the same manner as prize-money (q.v.). When the number of persons on board the destroyed ship cannot be accurately ascertained, an estimate is made, based on the complement of a ship of the same class in the United States Navy. This bounty is authorized by the United States laws, but Congress must first make an appropriation for that purpose.

BOUNTY, THE. The name of an English vessel under the command of Captain Bligh, the crew of which in 1789 mutinied near the Friendly Islands, and abandoned nineteen men, including the captain, in a small boat with scant provisions. After many hardships, the boat at last reached Timor, whence Bligh returned to England. In 1814, by the accidental discovery of a settlement on Pitcairn Island (q.v.), it was found that eight of the mutineers of the *Bounty* had escaped to the island and colonized it. The last of the mutineers died in 1829. The incident was used by Lord Byron in his poem "The Island."

BOUNTY-JUMPER. In American history, one of the class of men who, while bounties were being paid for enlistments during the Civil War, entered the service with the intention of deserting at the earliest opportunity after obtaining the promised reward. They would frequently reënlist under different names, and repeat the process until caught, one man, in 1865, confessing that he had 'jumped the bounty' thirty-two times. The bounties differed in amount in different parts of the country, being greatest in the State of New York. Consult Fry, *Report of the Provost Marshal-General* (Washington, 1866).

BOUQUET, bōō'kā', HENRY (1719-66). A British soldier, who served for many years in America. He was born in Rolle, Switzerland, entered the army of the Low Countries in 1736, served alternately with the Dutch and the Sardinians, and in 1756 entered the English service in America as lieutenant-colonel of the 'Royal American Regiment.' He was second in command of the army which, under General Forbes, captured Fort Duquesne in 1758 (see PITTSBURG), and was left in command when Forbes returned to Philadelphia. In 1763, while in command at Philadelphia, he was sent with 500 men to relieve Fort Pitt (formerly Fort Duquesne), then closely besieged by Pontiac's followers, and at Bushy Run, about 20 miles from the fort, defeated the Indians (August 5-6) and thereby virtually suppressed the great conspiracy. (See PONTIAC.) In October, 1764, he forced the Ohio Indians to make peace at Tuscarawas. He was raised to the rank of brigadier-general, and in 1765 was placed in command of the Southern Department of America with headquarters at Pensacola, where soon afterwards he died of the fever. For the best account of his military services, consult Parkman, *Conspiracy of Pontiac* (Boston, 1867). Consult also an article on the subject in the *Pennsylvania Magazine of History and Biography,* Vol. III. (Philadelphia).

BOUQUET DE LA GRYE, bōō'kā' de là grē', JEAN JACQUES ANATOLE (1827—). A French hydrographer and astronomer. He was born in Thiers (Puy de Lôme), and was educated at the Ecole Polytechnique. One of his most important and difficult surveys was that of New Caledonia, of which region he prepared forty charts (1853). He was the promoter of the project to make Paris a seaport by means of a ship-canal and the widening of the Seine. Bouquet de la Grye is almost equally famous as an astronomer and as a perfecter of astronomical instruments. His works include: *Pilote des côtes Ouestes de France; Notes sur la sondage à la mer; Etude*

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hydrographique sur la baie de La Rochelle; Paris, Port de Mer; Notes sur les sondes faites par de grandes profondeurs.

BOUQUETIN, bōō'k'-tăn' (Fr., for OF. *bouc d'estain: bouc,* goat + *de,* of + *estain,* carded wool). A wild goat, steinbock, or ibex, especially that of the Alps or Pyrenees. See IBEX.

BOUQUET (bōō-kā') **OF WINE** (Fr. *bouquet,* nosegay, bunch of flowers, OF. *bosquet,* dimin. from Low Lat. *boscus,* thicket). A flavor or aroma characteristic of the better class of wines, and due chiefly to the presence of volatile constituents, as alcohols and ethers. According to some authorities, the characteristic bouquets of wines are caused by the different kinds of yeast used in the various districts; the same must, fermented with yeasts from several different districts, has yielded wines possessing different bouquets. On the other hand, the bouquet of the wine from Riesling grapes is said to be caused by the action of frost.

BOURBAKI, bōōr'bä'kē', CHARLES DENIS SAUTER (1816-97). A French general. He was born at Pau, was educated at Saint-Cyr, served for some time in Algeria and rose to the rank of brigadier-general in 1854. In the Crimean War he won distinction at the Alma, at Inkerman, and in the assault on Sebastopol. He also participated in the Italian campaign of 1859. In 1869 he was commander of the second camp at Châlons, and aide-de-camp to the Emperor. In the war with Germany he was placed in command of the Imperial Guard and took an important part in the conflicts around Metz. After having been for a short time at the head of the Army of the North, he was in December, 1870, placed in command of the Army of the Centre, soon transformed into that of the East. The advance of Bourbaki forced Von Werder to evacuate Dijon on December 27, but his attack upon Von Worder's position at Héricourt before Belfort (January 15-17, 1871) was repulsed. He was compelled to retreat, but, finding his way toward Lyons cut off by the German Army of the South, was driven to despair by his hopeless situation and attempted suicide, but the wound (a pistol-shot in the head) was not fatal. As soon as his condition permitted, he returned to France, and was appointed to the command of an army corps at Lyons in July, 1871. He retired in 1881.

BOURBON, bōōr'bon, *Fr. pron.* bōōr'bôn', HOUSE OF. A younger branch of the Capetian family of France, representatives of which occupied several European thrones after the Sixteenth Century. The house derived its name from the castle and seigniory of Bourbon, in the former Province of Bourbonnais, in the centre of France, where now stands the little town and watering-place of Bourbon-l'Archambault. The first lord or *sire* of this family of whom history makes mention was Adhémar, at the beginning of the Tenth Century. The fourth in succession from him, Archambault I., added the name of the family castle to his own. Under his successors, who also bore the name of Archambault, the family possessions were soon very much increased. At length the seigniory of Bourbon devolved upon an heiress, who in 1272 married Robert, the sixth son of Louis IX. of France. It thus passed to a branch of the royal family of the Capetians, under whom it was converted into a duchy. The principal branch of this family was, in 1523, deprived of all its dignities and possessions, because the Duke, Charles de Bourbon (q.v.), the famous Constable, allied himself with Charles V. against Francis I. of France. Of the collateral branches, that of Vendôme acquired great importance, first attaining by marriage, in the person of Antoine de Bourbon, Duke of Vendôme, the throne of Navarre; afterwards by inheritance the throne of France, in the person of Henry IV., on the extinction of the male line of the house of Valois (q.v.); and by fortune of war the thrones of Spain, Naples, and Parma. Among the numerous other collateral branches may be mentioned those of Montpensier, De la Marche, Condé, Conti, Soissons, and Orleans. Only a few members of the collateral lines, however, have borne the name of Bourbon; for example, the Cardinal Charles de Bourbon, Duke of Vendôme, who, under the name of Charles X., was set up by the Catholic League as a rival king to Henry IV. The ducal dignity was revived by Louis XIV. in the house of Condé (q.v.), so that the eldest son of that house should bear the title of Duke of Bourbon.

The dynasty of the Bourbons in France begins with Henry IV. (q.v.), who, after the assassination of Henry III., became, by virtue of the Salic law (q.v.), the heir to the French throne. Through his father, Antoine de Bourbon, King of Navarre and Duke of Vendôme, he was descended from Robert, son of Louis IX., and husband of Beatrix, heiress of Bourbon. On his assassination in 1610, he left, by his second wife, Maria de' Medici, five legitimate children; (1) Louis XIII., his successor on the throne; (2) Gaston, Duke of Orleans (q.v.), who died in 1660, and left no male heirs; (3) Elizabeth, married to Philip IV. of Spain; (4) Christina, married to Victor Amadeus, afterwards Duke of Savoy; (5) Henrietta, married to Charles I. of England.—LOUIS XIII., on his death in 1643, left two sons by his Queen, Anne of Austria, daughter of Philip III. of Spain: (1) Louis XIV., his successor; and (2) Philip, who received from his elder brother the title of Duke of Orleans, and was the founder of the family which has become the younger Bourbon dynasty.—The dauphin LOUIS, son of Louis XIV. by his marriage with Maria Theresa of Spain, died in 1711, and left three sons by his marriage with Maria Anna of Bavaria: (1) Louis, Duke of Burgundy; (2) Philip, Duke of Anjou, who afterwards became King of Spain, as Philip V.; (3) Charles, Duke of Berry, who died in 1714.—LOUIS, Duke of Burgundy, died in 1712. By his wife, Maria Adelaide of Savoy, he had three sons, of whom two died in early youth, the only one who survived being Louis XV., who succeeded his great-grandfather, Louis XIV., in 1715.—LOUIS XV. having married Maria Leszczynska, daughter of the dethroned King Stanislas of Poland, had by her a son, the dauphin Louis, who married Maria Josepha of Saxony, and died in 1765, leaving three sons: (1) Louis XVI., who succeeded his grandfather, Louis XV., in 1774; (2) Louis Stanislas Xavier, Count of Provence, afterwards Louis XVIII.; (3) Charles Philippe, Count of Artois, afterwards Charles X.—LOUIS XVI. had three children by his Queen, Marie Antoinette of Austria: (1) The dauphin Louis, who died in 1789; (2) Louis, called Louis XVII., who died

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in 1795; (3) Marie Thérèse Charlotte, styled Madame Royale, afterwards Duchess of Angoulême. — LOUIS XVIII. had no children; but Charles X. had two sons: (1) Louis Antoine de Bourbon, Duke of Angoulême, who was dauphin prior to the Revolution of 1830, and died without issue in 1844; (2) Charles Ferdinand, Duke of Berry (q.v.), who was murdered in 1820.—The Duke of Berry left two children: (1) Marie Louise Thérèse, styled Mademoiselle d'Artois, married to the Duke of Parma; (2) Henri Charles Ferdinand Marie Dieudonné, Duke of Bordeaux, later styled Count of Chambord, the representative of the elder branch of the Bourbons. The latter died childless in 1883, and the legitimists accepted in his stead the Orleanist Count of Paris, grandson of King Louis Philippe, as head of the house of Bourbon. The Count of Paris died in 1894, and his son, the Duke of Orleans, now represents legitimacy.

The founder of the Orleans or younger branch of the Bourbon royal family of France was Philip, Duke of Orleans, the younger brother of Louis XIV. He died in 1701, leaving, by his second marriage, with Elizabeth Charlotte of the Palatinate, a son of his own name as his heir, who was regent of France during the minority of Louis XV. The latter's son, Louis Philippe, Duke of Orleans (born 1703), married a princess of Baden, and died in 1752, leaving an only son of his own name (1725-85), whose son and heir was that Louis Joseph Philippe, Duke of Orleans, so notable in the French Revolution, who, in 1792, renounced his rank, taking the name of Citizen Egalité, and died by the guillotine in 1793. Philippe Egalité left four children: (1) Louis Philippe, who, before the Revolution, was styled Duke of Chartres—that being the ordinary title of the eldest son of the Orleans family—became afterwards Duke of Orleans, was King of the French from 1830 to 1848, and died in England on August 26, 1850; (2) the Duke of Montpensier, who died in England in 1807; (3) the Count of Beaujolais, who died at Malta in 1808; (4) Adelaide, styled Mademoiselle d'Orleans (1777-1847). —LOUIS PHILIPPE left a numerous family by his Queen, Amelia of Naples. His eldest son, Ferdinand, Duke of Orleans, lost his life in an accident on July 13, 1842, leaving by his wife, the Princess Helen of Mecklenburg-Schwerin, two sons, the eldest of whom, Louis Philippe Albert, Count of Paris (1838-94) (q.v.), left as his heir Louis Philippe Robert, Duke of Orleans, born February 6, 1869. Concerning the other members of Louis Philippe's family, see the article LOUIS PHILIPPE.

Louis XIV. having succeeded in placing his grandson, Philip, Duke of Anjou, on the throne of Spain, in 1700, as Philip V., this prince became the founder of the Spanish Bourbon dynasty, as well as of the Bourbon dynasties of Naples, and Parma and Piacenza. These dynasties endured only a temporary overthrow from the policy and arms of Napoleon Bonaparte. Philip V. was succeeded on the Spanish throne by his son, Ferdinand VI., who died without issue in 1759, and the crown fell to his brother, Charles III., whose son and successor, Charles IV., was compelled to resign it in 1808, in favor of a successor nominated by Napoleon, and died at Naples in 1819. The two eldest sons of Charles IV. by his marriage with Maria Louisa of Parma were—(1) Don Fernando, Prince of Asturias, who, after the overthrow of Napoleon, reigned as Ferdinand VII., whose eldest daughter was Isabella II., the mother of Alfonso XII.; (2) Don Carlos (see CARLOS DE BOURBON), who in 1833 became pretender to the Spanish throne, and in 1845 resigned his pretensions in favor of his son, Don Carlos, who styled himself Count of Montemolin. He died at Trieste, 1855. The Count of Montemolin died in 1861, and his claims to the Spanish throne are now represented by his nephew, Don Carlos, son of his brother Juan.

When the Bourbon dynasty was established on the throne of Spain in the person of Philip V., Naples and Sicily were severed from that monarchy (1713-14). Naples was given to Austria, and Sicily to Savoy, which in 1720 ceded the island to Austria in exchange for Sardinia. In the treaty of Vienna (1735), Don Carlos, son of Philip V., became King of the Two Sicilies, as Charles III. Upon his accession to the throne of Spain in 1759, he gave up that of the Two Sicilies to his third son, Don Fernando, called Ferdinand IV., with the express stipulation that it should never again be occupied by a King of Spain. Ferdinand IV. was deprived of Naples by Napoleon in 1806; but after the overthrow of Napoleon he recovered it, and in 1816 he proclaimed himself King of the consolidated realm of the Two Sicilies as Ferdinand I. His son, Francis I., left the throne in 1830 to his son Ferdinand II. (q.v.), whose son, Francis II., was expelled in 1860, when Naples was incorporated with the new Kingdom of Italy.

By the peace of Aix-la-Chapelle in 1748, Austria made over the duchies of Parma and Piacenza to Don Philip, the youngest son of Philip V. of Spain, but with the stipulation of their reversion to Austria on the failure of male descendants, or on his succeeding to the throne of Spain. He was succeeded in 1765 by his son, Ferdinand I., whose son, the hereditary Prince Charles Louis, was made King of Etruria in 1801, under the guardianship of his mother, Maria Louisa of Spain, the cession of Parma and Piacenza to France on the death of Ferdinand being provided for. Ferdinand died in 1802, and in 1807 Napoleon took possession of Etruria. The Congress of Vienna assigned Parma and Piacenza for life to Maria Louisa of Austria, the spouse of Napoleon, but meanwhile indemnified Maria Louisa of Spain with the Duchy of Lucca. The latter was succeeded in 1824 by her son Charles Louis. He made over Lucca to Tuscany in 1847, and in the same year Parma and Piacenza reverted to the Bourbon family, in his person. He abdicated on March 14, 1849, and was succeeded by his son, Charles III., and he in 1854 by his son Robert—born 1848—whose mother, Marie Louise Thérèse de Bourbon, daughter of the Duke of Berry, then became regent of the duchies. The Bourbon family ceased to reign here in 1859. See ITALY and PARMA.

BIBLIOGRAPHY. Coiffier Demoret, *Histoire du Bourbonnais* (Paris, 1824); Achaintre, *Histoire chronologique et généalogique de la maison royale de Bourbon*, 2 vols., illus. (London, 1825); D. A. Bingham, *The Marriages of the Bourbons* (1890); Coxe, *Memoirs of the Kings of Spain of the House of Bourbon, 1700-88*, 5 vols. (London, 1815); Dunning, Baron Ashburton, *Genealogical Memoirs of the Royal House of France* (London, 1825); L. Dussieux, *Généalogie de la maison de Bourbon de 1256 à 1869* (Paris, 1869); Huillard-Bréholles et A. Lecoy de la Marche,

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Titres de la maison ducale de Bourbon (Paris, 1867-74); Lehec, *Généalogie des Bourbons de France, d'Espagne, de Naples, et de Parme* (Châteauroux, 1880).

BOURBON, bōōr'bôn', ANTOINE DE. See ANTOINE DE BOURBON.

BOURBON, CHARLES, Duke of Bourbonnais (1489-1527). A French general, known as the Constable de Bourbon. He was the son of the Count of Montpensier. In consequence of the death of his elder brother, and his marriage with the only daughter of the Duke of Bourbon, he united in his own possession the vast estates of both these branches of the Bourbon family, which alone at that time retained the old feudal power. He distinguished himself by the brilliancy of his exploits in arms, and by his rigid morals. At the age of 26 he was made Constable of France (the highest military office in the kingdom), and was sent to Italy at the head of an army. Crossing the Alps by passes previously deemed impracticable, he surprised the hostile generals, won the battle of Marignano, September 13 and 14, 1515, and within a few days placed the keys of the citadel of Milan in the King's hand. Accounts differ as to his later career. It is charged by French historians that Charles of Bourbon was the victim of an overweening pride and jealousy; that he claimed more credit than really belonged to him, and that his treason was not at all justifiable. On the other hand, he is represented as the victim of a woman's revenge. It is said that Marie Louise, the King's mother, became enamored of the brave Constable; and that he, although a widower, declined her hand, openly declaring that he deemed her a woman devoid of modesty, and not to be thought of for a wife. Through her influence the estates which he had acquired through his wife were seized and his perquisites as Constable were withheld. Thus deeply injured, he renounced the interest of France, and concluded a private alliance with the Emperor Charles V. and with Henry VIII. of England for the conquest and partition of France. The King, who was engaged in an expedition to Italy, received intelligence of this conspiracy. He proceeded forthwith in person to the Constable, and offered him restoration to favor and also to his estates. The Constable, however, did not trust him, but fled in disguise, and reached Franche-Comté in 1523. He attacked, in 1524, the French Army on its march over the Alps, and planned an invasion of France with the Spaniards. But Charles V. did not entirely trust him, and appointed the Marquis of Pescara to assist and watch him. He was forced to relinquish the siege of Marseilles on the approach of Francis I. with a great army. He repassed the Alps, and took his revenge in the battle of Pavia, February 24, 1525, where the King was made a prisoner. (See FRANCIS I.) He now went to Madrid, but soon found himself disappointed in his hopes, and returned to Lombardy to carve out his own fortune. He took Milan from Maximilian Sforza and then assailed Rome. In the assault, May 6, 1527, he was mortally wounded by a bullet, which Benvenuto Cellini afterwards asserted that he had shot. His death was kept secret for a time from the army under his command. The city was sacked, and when the army departed from Rome two months later, his corpse, which the soldiers would not part with, was taken with them, and buried at Gaeta, under a magnificent monument, which, however, was afterwards destroyed. (See BOURBON, HOUSE OF, for genealogy and references.) Consult: Coignet, *Francis the First and His Times* (London, 1888); Robertson, *History of the Reign of Charles V.* (Philadelphia, 1864-67); Lavisse and Rambaud, *Histoire générale* (Paris, 1893-1901).

BOURBON, ILE DE. See RÉUNION, ILE DE LA.

BOURBON, LUIS MARIA DE (1777-1823). A Spanish prelate and politician. He was born at Cadahalso, took orders, was appointed Archbishop of Seville in 1799, Archbishop of Toledo in 1800, and in the latter year received also the cardinal's hat. During the French occupation he was president of the Cadiz regency, and as such approved the decrees of the Constituent Assembly of the Cortes. Thus he signed the Constitution of 1812, and abolished the Inquisition. Upon the return of the King, in 1814, he at first fell into disfavor, but subsequently was appointed president of the governmental junta and a councilor of State.

BOURBON-LANCY, bōōr'bôn' lăn'sē'. A watering-place in the Department of Saône-et-Loire, France, 40 miles northwest of Charolles (Map, France, K 5). It is celebrated for its thermal springs, which contain chloride of sodium and iron. The town is beautiful in situation, and has a hospital with 400 beds built by the Marquis d'Aligre. Population, in 1896, 4162. The Romans knew this city as Aquæ Nisineii or Nisinienses, and remains of their baths are to be seen.

BOURBONNAIS, bōōr'bô'nā' (so called from *Bourbon*). A former province of Central France, now comprised within the departments of Allier, Cher, and Nièvre. From 1327 to 1523 it formed the Duchy of Bourbon. In the latter year it was annexed to the Crown, but was bestowed, in 1661, on the House of Bourbon-Condé, which held it until the Revolution. Consult: Nicolay, *Description et histoire du Bourbonnais* (Monlins, 1875); Montégut, *En Bourbonnais et en Forez* (Paris, 1881).

BOURBONNAIS. A village in Kankakee County, Ill., 56 miles south of Chicago; the seat of Notre Dame Academy and of Saint Viateur's College (Roman Catholic), opened in 1865. Population, in 1900, 595.

BOURBONNE-LES-BAINS, bōōr'bŭn' lā băn' (Fr., The Baths of Bourbonne, Med. Lat. *Bourbonia*, formerly *Aquæ Borvonis*, Baths of Borvo, Borvo being among the Gauls a name for Apollo). A town and watering-place in the Department of Haute-Marne, France, pleasantly situated by the Amance on an eminence amid wooded country, 20 miles east-northeast of Langres (Map: France, M 4). It has a fine church of the Twelfth Century, a large military hospital, and some interesting ruins of a château of the ancient Seigneurs de Bourbonne. Its thermal springs attract some 3000 invalids annually. They are strongly impregnated with chloride of sodium; and their temperature is from 140° to 150° F. Population, in 1896, 4156. The Romans knew these springs under the name Aquæ Borvonis.

BOURBOULE, bōōr'bōōl', LA. A health resort in the Department of Puy-de-Dôme, France, on the Dordogne, 22 miles southwest of Cler-

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mont. It is noted for its mineral thermal springs and is visited annually by over 7000 persons. Its bottled waters constitute a thriving export industry. Its picturesque situation amid some of the finest scenery of ancient Auvergne adds to its attractiveness. Population, in 1901, of town, 1404; of commune, 1947.

BOURCHIER, bōōr'chĭ-ēr, *Fr. pron.* bōōr'-shyā', ARTHUR (1864—). An English actor and manager. He was born at Speen, Berkshire, and educated at Eton and Oxford. While at the university he won distinction as an amateur actor, and in 1889 he went upon the professional stage, playing with Mrs. Langtry, at Wolverhampton, as Jacques in *As You Like It*, in which he appeared in London the next year at the Saint James Theatre. Later he played for a time at the Criterion. In March, 1892, he was at the Shaftesbury Theatre, in his own play of *Mr. Richards*. Soon afterwards he joined Augustin Daly's company and went to America, returning early in 1893 to play at Daly's London theatre, where he had the rôle of Robin Hood in Tennyson's *Foresters*. In 1894 he married Miss Violet Vanbrugh, a talented actress, who has continued upon the stage with her husband. In the fall of 1895 he took the Royalty Theatre, producing among the plays *The Chili Widow*, an adaptation of his own, which ran for over 300 nights. Subsequently he appeared in leading parts at the Garrick, Strand, and Court theatres, and with Charles Wyndham, at Wyndham's Theatre. Then, as Wyndham's partner at the Criterion, he helped to bring out *His Excellency the Governor*, and *Lady Huntworth's Experiment*. He has since taken the Garrick Theatre, producing J. M. Barrie's play *The Wedding Guest* (1900).

BOURDALOUE, bōōr'dȧ'lōō', LOUIS (1632-1704). One of the greatest pulpit orators of France. He was born at Bourges, August 20, 1632, and after having, at the age of sixteen, entered the order of Jesuits, obtained in succession the chairs of humanity, rhetoric, philosophy, and theological ethics in the academy of his native place. He showed a great capacity for science, but his remarkable powers of eloquence led his superiors finally to determine upon employing him as a preacher. Disdaining the inflated style prevalent among the tasteless pulpit orators of his time, he assailed with manly vigor and truly religious earnestness the passions, weaknesses, and errors of men. The dignity of his manner and the fire of his eloquence made him famous even when the public mind was occupied with the festivities of Versailles, the victories of Turenne, and the literary masterpieces of Corneille and Racine. At the Court of Louis XIV. he was remarkably well received. After the revocation of the Edict of Nantes (1685) he was sent to Montpellier to convert the Protestants. Bourdaloue particularly understood how to accommodate his eloquence to the minds of those whom he addressed. Simple among the simple, a dialectician among ecclesiastics, he was equally a favorite with the common people and with the learned and the great. He was also much esteemed and beloved as a man and in all circumstances maintained unimpeached a high reputation for candor and honesty. In the later years of his life he relinquished the pulpit and devoted his time to hospitals, prisons, and pious institutions. He died in Paris, May 13, 1704. How thoroughly his religious sentiments were governed by the theological tenets of his Church may be perceived from these remarkable words which he uttered on his death-bed: "It is highly reasonable that God be fully satisfied; and at least in purgatory I will suffer with patience and with love." His *Sermons and Moral Discourses* appeared in English translation (Dublin, 3d ed., 1855), also his *Married Life: Its Obligations, Trials, etc.* (London, 1897); several French editions of his works have been published, e.g. *Collection universelle des orateurs sacrés*, Vols. XIV.-XVI., reprint of François Bretonneau's edition (latest edition, Paris, 1891, 6 vols.). For his biography, consult: Anatole Feugère, *Bourdaloue la prédication et son temps* (Paris, 1874, 5th ed., 1889); M. Lousas (Paris, 1881, 2 vols.); and L. Pouthe (Paris, 1900); also J. B. E. Tousserat, *Etude généalogique sur les Bourdaloue* (Paris, 1900).

BOURDEILLES, bōōr'dȧ'y'. See BRANTÔME.

BOURDON, bōōr'dŏn' (Fr., It. *bordone*, a humming, a buzzing, a drone; Med. Lat. *burdo*, drone; cf. Eng. *burden*, refrain of a song). In music, a drone bass produced by a bagpipe or hurdy-gurdy; also an organ-stop, consisting of stopped wooden pipes, usually of 16-feet tone.

BOURDON, SÉBASTIEN (1616-71). A French painter, born in Montpellier. He studied in Paris under a mediocre artist named Barthélemy, and painted frescoes in Bordeaux. In Rome from 1634 to 1636 he carefully studied the works of the Carracci, and copied old masters for a dealer. After his return to Paris he firmly established his reputation by his "Martyrdom of Saint Peter" (Louvre Gallery), and became one of the ten original members of the Academy of Painting. In 1652-53 he was in Sweden as Court painter, and subsequently was rector of the Academy of Painting. He is known chiefly as an historical painter, but he worked also in other styles. His paintings are generally brilliant and of large grasp, but sometimes lack care in drawing and are dull in color. They further include "Descent from the Cross" (Louvre); "Julius Cæsar Before the Tomb of Alexander" (Louvre); "Group of Merchants" (Museum of The Hague); and "Return of the Ark from Captivity" (National Gallery, London).

BOURDON DE L'OISE, bōōr'dŏn' *de* lwăz', FRANÇOIS LOUIS. A notorious character of the French Revolution. He was born in the middle of the Eighteenth Century, at Saint-Remy, near Compiègne, and became a procurator in the Parlement of Paris. He participated in the storming of the Tuileries on August 10, 1792. He shortly afterwards obtained a seat in the Convention by a trick which, though subsequently discovered, did not lead to his ejection. Bourdon de l'Oise contributed much to bring about the execution of Louis XVI., the insurrection of May 31, and the destruction of the Girondists. He was sent to La Vendée, where, however, he loudly condemned the Revolutionary cruelties and assumed the attitude of a moderate. Obnoxious on this account to Robespierre and Hébert, and fearing for his head, he urged with the greatest eagerness the overthrow of the Terrorists on the 9th Thermidor (July 27), 1794. From this time forth Bourdon de l'Oise showed himself an enemy of the clubs and a

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protector of the nobles and the priests. In consequence of the insurrection of 13th Vendémiaire (October 5), 1795, he was sent as a commissioner to Chartres, where he behaved harshly and brutally. He passed from the Convention into the Council of Five Hundred, became a persecutor of the Republicans, and joined a Royalist club. The Directory placed him upon the proscribed list, after the 18th Fructidor (September 4), 1797. He was transported to Cayenne, where, in a short time, he died in great misery.

BOURGELAT, bōōrzh'lä', CLAUDE (1712-99). A French lawyer, the founder of the first veterinary school in Europe. He was a learned lawyer, an able writer, and numbered among his friends such men as D'Alembert, Pembroke, Voltaire, Buffon, and Haller. He was impelled to further the cause of veterinary science by his fondness for horses. In 1761 he and a minister of Lyons, named Bertin, opened the first veterinary school in the suburbs of that city. It was patronized by students from all parts of France, Italy, Switzerland, Germany, Sweden, and Denmark. From this school all other colleges in Europe sprang, and with them it has kept pace, being superior to the majority, and rivaling the very best, even those of Paris and Berlin.

BOURG-EN-BRESSE, bōōrg'äN-brĕs' (Fr., fort in Bresse, an ancient province of France; anciently *Villa de Burgo in Bressia*). The chief town of the Department of Ain, in France, situated on the Reyssouse, 38 miles northeast of Lyons (Map: France, M 5). The streets are crooked and narrow, but clean, and the squares are adorned with statues and fountains. Among its public institutions are the famous church Notre Dame de Brou, containing the courts of the house of Savoy, a lyceum, a school for male and female teachers, a school of obstetrics, two hospitals, a lunatic asylum, a museum, and a library. Its manufactures are faïence, artificial mineral waters, and lace. It has an important trade in grain, poultry, fatted cattle, horses, and wine. Population, 1896, 18,501. Consult Charvet, *Les édifices de Brou à Bourg-en-Bresse* (Paris, 1897).

BOURGEOIS, bûr-jois'. See TYPOGRAPHY.

BOURGEOIS, ANICET. See ANICET-BOURGEOIS.

BOURGEOIS, bōōr'zhwä', LÉON VICTOR AUGUSTE (1851—). A French politician. He was born in Paris, and studied at the Lycée Charlemagne. In 1877 he became general secretary of the Department of Marne, and in 1880 sub-prefect of Rheims. In 1882 he was appointed prefect of the Department of Tarn, in 1885 prefect of the Department of Haute-Garonne. He became director of the Ministry of the Interior, in 1886, and in 1887 prefect of police. He was elected deputy for Marne in 1888, in the same year was appointed Under-Secretary of State in the Ministry of the Interior, and in 1889 became Minister of the Interior. From 1890 to 1892 he was Minister of Public Instruction, and from December, 1892, to March, 1893, Minister of Justice. In 1895-96 he was Prime Minister. In 1898 he was appointed Minister of Public Instruction, in which post he displayed high efficiency, and from which he resigned in the same year, upon the resignation of the Brisson Cabinet. In 1899 he was the head of the French delegation to The Hague Peace Conference. His best-known work is *Solidarité* (1897).

BOURGEOIS GENTILHOMME, bōōr'zhwä' zhäN'tē'lōm', LE (Fr., The Bourgeois Turned Gentleman). The title of a popular comedy by Molière (1670). Here we meet M. Jourdain, who had been "speaking prose all his life without knowing it."

BOURGEOISIE, bōōr'zhwä'zē' (from Late Lat. *burgensis*, inhabitant of a borough). A French term, now frequently employed in English, German, and other languages. It denotes the citizens of towns as a rank or class of society, including grades from heads of manufacturing or mercantile establishments down to master-tradesmen. The French Bourgeoisie have long been extremely hostile to the aristocracy, but have themselves become the object of attack on the part of the operatives and of the extreme Radical or Red Republican Party. The term *bourgeois*, from which bourgeoisie is formed, is quite distinct in meaning from *citoyen*, the latter term designating a citizen of the State.

BOURGES, bōōrzh (Lat. *Bituriges*, a tribe of Gaul). The ancient capital of Berry, now of the Department of the Cher, France, the seat of an archbishopric, and a military arsenal, situated in the midst of a fertile plain, at the confluence of the Auron and the Yèvre, 123 miles south of Paris (Map: France, J 4). High towers still mark points on the ramparts, which surrounded the old town. Shady boulevards now take the place of the dismantled walls. The old town is made up of crooked streets and quaint houses; it stands in the heart of the new town. Its most conspicuous building is the noble cathedral of Saint Etienne, with its superb flying buttresses, its five western portals, leading to the five naves of the interior, which is lighted by stained-glass of unique beauty. This church was begun in the Thirteenth Century and completed in the Sixteenth Century. The House of Jacques Cœur, the banished silversmith of Charles VII., is the next most interesting building, and is now used as the Palais de Justice. Bourges is a centre of trade in wine, grain, cloth, cattle, hemp, and mill-stones. It has iron foundries, tan-yards, and cloth factories. Population, in 1896, 43,587. Bourges was the capital of the Gallic Bituriges, and the Roman *Avaricum*, after its capture by Julius Cæsar in 52 B.C. It was successively taken by the Visigoths, under Euric, by Clovis, Pepin the Short, and the Northmen. When Orleans was occupied by the English, Charles VII. made it his capital. Its university, at which Calvin, Amyot, and Theodore de Beza studied, was abolished in the Revolution. It was the birthplace of the astute Louis XI., the eloquent Bourdaloue, and the famous Jacques Cœur.

BOURGET, bōōr'zhä', LAC DU. A beautiful lake in the Department of Savoie, France, 7 miles northwest of Chambéry. A railway which skirts its eastern shore connects Chambéry with the village of Le Bourget (population, in 1901, 1309) at the south end of the lake. The lake, inclosed by picturesque heights, is 10 miles long, 3 miles broad, and 475 feet deep; it is famed for its 'Lavaret,' a species of fresh-water mackerel; its outlet is by the Canal de Savières on the northwest, which connects with the Rhone. The château de Châtillon, the monastery of

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Hautecombe, and the ancient château of Bourdeaux are conspicuous features in the vicinity.

BOURGET, Le, or Le Bourget-Drancy. A village in the French Department of Seine, about six miles northeast of Paris. In the Franco-Prussian War it was the scene of serious French repulses, especially the disasters of October 30 and December 21, 1870. Population, 1896, 2550.

BOURGET, Paul (1852—). A notable French analytic essayist and novelist. He was born at Amiens, September 2, 1852. His father was a Russian, his mother English, while he is himself a cosmopolitan by instinct, study, and travel, lacking provincial prejudices, but also national conviction — a typical scholarly dilettante. After a brilliant school career, finished at the famous Collège de Sainte-Barbe in Paris, he began life as a journalist and, as seems the French custom, made his first bow to literature in a volume of daintily hedonistic and pessimistic verse that earned him from Augier the name of 'Melancholy Pig.' These sighs of *Restless Life* (*La vie inquiète*, 1874), breathed in Latin Quarter cafés, were repeated in *Edel* (1878) and *Les aveux* (1882). With the *Essais de psychologie contemporaine* (1883), followed by *Nouveaux essais* (1885), and two volumes of *Etudes et portraits* (1888-89), Bourget appears in his own words as "a moralist of the decadence," "a maniac of psychology," and "a passionate lover of analysis." He did here as critic what he was to do later as a novelist: he carried realistic observation beyond the externals of Zola and Maupassant to what he called 'states of soul.' Thus he unites the methods of Stendhal and of Balzac, and it is by no accident that one of the first of his essays is devoted to the former writer, whose reputation he did much to reëstablish. Bourget called himself a moralist, but he was rather an analyst, offering a brilliant diagnosis, but no prescription. His criticism reflects the dilettante skepticism of Renan; and his early fiction bears strong marks of the same influence, which even the later novels do not wholly avoid. They have been happily described as a seductive if somewhat sickly product of the hothouse of an outworn civilization, uniting intellectual keenness with morbid sensitiveness, dealing by preference with the cosmopolitan types of that low life which is usually called 'high.' In the early novels there is a good deal of snobbishness which he himself mocks in the later ones. *Mensonges* (1887) marks the cardinal point of his fiction. *L'Irréparable* (1884); *Cruelle énigme* (1885); *Crime d'amour* (1886); *André Cornélis* (1887), place the interest in situation and environment rather than in character. Analysis is attempted, but description predominates. In the later fiction, *Le disciple* (1889); *Terre promise* (1892); *Cosmopolis* (1892); *Un scruple* (1893); *Steeplechase* and *Un saint* (1894); *Idylle tragique* (1896); *Les complications sentimentales* (1898); *La duchesse bleue* (1898); *Voyageuses* (translated as *Antigone*); *Drame de famille* (1900); *Un homme d'affaires* (1900); *La fantôme* (1901); as well as in the cynical *Psychologie de l'amour moderne* (1890), and in the impressions of travel, *Sensations d'Italie* (1891), *Nouveaux pastels* (1891), *Outre-Mer* (1895), the dominant interest is in a morbid psycho-pathology and significantly peculiar 'states of soul,' though the latest volumes of fiction show increasing subtlety, maturity, and moral strength. Before *Cosmopolis* (1892) the ethical triumph is with cynical selfishness, though common-sense moralists like the Abbé in *Mensonges* occasionally find a tongue to describe their fellow-actors, justly enough, as "wretches who live at the mercy of their sensations." From *Cosmopolis* onward, Bourget swims with the wave of reaction toward religious sentiment and curiosity that came from a union of the spiritual mysticism of the Russians with the sensuous mysticism of Baudelaire and has affected the work of many others (e.g. Vogüé, Brunetière, Huysmans, Daudet). Bourget's style is very uneven, affected, incorrect at times, but capable of a terse simplicity that unites strength and beauty to a rare degree. In temper the impression that he leaves is of a passive disillusion. He is never bitter, and one wonders if he is often sincere in posing as a type of "the atrocious modern uneasiness that comes from regret at unbelief and dread of the moral void." Nearly all of Bourget's work since 1892 is translated into English. Consult: Renard, *Les princes de la jeune critique* (Paris, 1890); Doumie, *Ecrivains d'aujourd'hui* (Paris, 1894); Pellissier, *Essais de litérature contemporaine* (Paris, 1893); and Lemaître, *Les contemporains*, Vol. III. (Paris, 1886-89).

BOURGOIN, bōōr'gwăn'. The capital of a canton in the Department of Isère, France, on the Bourbre, 9 miles northwest of La Tour du Pin. It is the seat of active linen, woolen, paper, and other industries. Situated on the ancient marsh bed of the Rhone, it was known to the Romans as *Bergusium*. Population, in 1901, of town, 5246; of commune, 7279.

BOURGOIN, bōōr'gwăn', Edme Alfred (1836—). A French chemist. He was born in Saint-Cyr-les-Colons (Yonne) and was educated in Paris. He became chief pharmacist at the Children's Hospital, Paris, in 1867; a member of the Council of Public Hygiene in 1881; and director of the central pharmacy of the Paris hospitals in 1885. Among his numerous important writings are the following: *Electrochimie* (1868); *Chimie organique*, *Principes de la classification des substances* (1876); *Traité de pharmacie galénique* (1880).

BOURGOING, bōōr'gwăn', Jean François, Baron de (1748-1811). A French diplomat, born in Nevers. He so distinguished himself in the military school in Paris that the Government sent him to the University of Strassburg to prepare himself for diplomatic service. After studying there he spent four years in Germany on different military and diplomatic missions. In 1777 he was sent to Madrid as first secretary of legation, and during his seven years' residence there he wrote his best-known book, *Nouveau voyage en Espagne, ou Tableau de l'état actuel de cette monarchie* (1789). In 1791 he was made Minister Plenipotentiary of Louis XVI. to Madrid, and subsequently took a conspicuous share in negotiating the peace preliminaries with Spain. In 1808 he became Minister to Saxony and was present in his official capacity at the Congress of Erfurt. In addition to the above mentioned appointments he held numerous other diplomatic posts in Germany and Holland. His *Mémoires historiques et philosophiques sur Pie*

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VI. (1789) was his most important historical work.

BOURIGNON, bōō'rē'nyôn', ANTOINETTE (1616-80). A Flemish religious visionary, once very popular. She was born at Lille, January 13, 1616. Her father was a merchant, and she inherited from him a considerable patrimony. She was so ugly an infant that there was some thought of killing her as a monstrous birth. Her intellect, however, was very acute, and its powers were early developed, along with a tendency to religious mysticism, which was much encouraged by the reading of mystic books, till her imagination became inflamed, and she began to fancy that she saw visions, conversed with God, received special revelations, and was called to restore the pure spirit of the Gospel. By the good offices of the Archbishop of Cambrai, she obtained admission into a convent, where she won over some of the nuns to her opinions, and soon found herself at the head of a considerable party. She afterwards had charge of a hospital at Lille, but from this position she was driven in consequence of her extravagant fancies. She now traveled through various countries, her enthusiasm gaining proselytes, whose conversion, she said, caused her to suffer the pains of childbirth. At last she was appointed head of a hospital in East Friesland. According to Madame Bourignon, religion consists in internal emotion, and not in either knowledge or practice. Among the chief expounders of Bourignianism was Peter Poiret, a Calvinistic minister. It spread to a remarkable extent both among Roman Catholics and Protestants; and about the end of the Seventeenth Century, and beginning of the Eighteenth, prevailed so much in Scotland that a solemn renunciation of it was demanded from every entrant on the ministry at his ordination. A minister of Aberdeen was deposed for it in 1701. The formal renunciation of Bourignianism is still continued in the Established Church of Scotland, but has been given up as needless by other Presbyterian churches. The works of Madame Bourignon were edited by Poiret (Amsterdam, 1680-86, 19 vols., 2d ed. 1717). They exhibit not a little fiery eloquence. She died at Franeker, October 30, 1680. Several of her works—e.g. *Treatise of Solid Virtue* (1699); *Restoration of the Gospel Spirit* (1707)—have been translated into English, and *The Light of the World* (reprinted, London, 1863, from the edition of 1696).

BOURINOT, bōō'rē-nŏt, Sir JOHN GEORGE (1837—). A Canadian historian, born in Sydney, Nova Scotia, October 24, 1837. After graduating from Trinity College, Toronto, he turned to journalism, establishing the *Halifax Reporter*, which he conducted for many years. In 1880 he became clerk of the Dominion House of Commons, a post which he long held. He has taken an active part in the proceedings of the Royal Society of Canada (established 1882), of which he has been president and is now honorary secretary. Here first appeared several admirable papers in politics and history, afterwards expanded into books. He has also contributed to the leading periodicals on both sides of the Atlantic. Among his books are *Parliamentary Procedure and Practice* (1884; new ed., 1891); *Manual of Constitutional History* (1888); *Parliamentary Government in Canada* (1892); *How Canada is Governed* (1895); *Cape Breton and Its Memorials of the French Régime* (1892); *Canada Under British Rule* (1900); *Intellectual Development of the Canadian People* (1880); and *Canada's Intellectual Strength and Weakness* (1893). For his service Bourinot has received academic honors from Laval University, and in 1898 he was created Knight Commander of Saint Michael and Saint George.

BOURMONT, bōōr'môn', LOUIS AUGUSTE VICTOR DE CHAISNES, Comte de (1773-1846). A French marshal. He was born September 2, 1773, at Château de Bourmont in the Department of Maine-et-Loire. Bourmont fought against the Republic under Condé, and after 1794 in the struggle in La Vendée. Later he was sent to represent the anti-revolutionary party in England. In 1799, when the insurgents in La Vendée had surrendered, Bourmont reappeared and set himself at the head of a guerrilla band, but after some brilliant successes was forced to capitulate. He soon after won the favor of the First Consul, but, becoming suspected of intrigue, was imprisoned at Besançon, whence he escaped to Portugal. When Lisbon was taken by Junot, Bourmont offered his services, and on a pledge of good faith from Junot, reëntered France and received successive commissions from Napoleon until he became general of a division. During Napoleon's final struggle, Bourmont vacillated and proved inconstant to Louis and Napoleon by turns. After Waterloo he received high military employment under Louis XVIII., was Minister of War in 1829, and in the Algerian campaign of 1830 won a marshal's bâton. After the July Revolution he went into exile, and served for a brief time under the King of Portugal. He died at Bourmont, October 27, 1846.

BOURNE, bōōrn, ALFRED GIBBS (1859—). An English biologist. He was born in Lowestoft, and was educated at the University College School, the Royal School of Mines, and University College, London. He was the assistant of E. Ray Lankester from 1879 to 1885, and during the last two years of that period was engaged in research at the Zoölogical Station, Naples. From 1891 to 1899 he was registrar of the University of Madras, botanist to the Government in 1897, and subsequently he was appointed principal and professor of botany at the Presidency College, Madras. His publications comprise numerous papers on the anatomy of Pelomyxa, Limnocodium, Chætobranchus, Leeches, Earthworms, Rotifera, Early Nautilus, Scorpion Poison, etc.

BOURNE, EDWARD GAYLORD (1860—). An American historian, born at Strykersville, N. Y. In 1883 he graduated with high honors at Yale, where he became professor of history in 1895. He is also a corresponding member of the Massachusetts Historical Society; became chairman of the historical manuscripts commission of the American Historical Association in 1901; and in 1900-01 was president of the New England History Teachers' Association. He has published many critical papers on historical subjects, a number of which have been collected in a volume, *Essays in Historical Criticism* (1901). They are good examples of painstaking research and the critical sifting of evidence and one of them, "The Legend of Marcus Whitman," aroused widespread discussion, and is generally considered

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to have settled the Whitman question (see WHITMAN, MARCUS). Professor Bourne has also published *The History of the Surplus Revenue of 1837* (1885).

BOURNE, GEORGE (1780-1845). An American clergyman. He was born at Westbury, Wiltshire, England; came to the United States in 1802, and again in 1804, and after remaining for some time in Baltimore, settled at Harrisburg, Va. There he established a printing-office and did everything in his power to educate the people in his pastorate. He early made himself conspicuous by advocating immediate abolition of slavery. In 1815 he organized a church of non-slaveholders, and wrote a work on *The Book and Slavery Irreconcilable* (1815). His views were ultra-radical for the time, and brought him into constant difficulties, which led him to give up his printing-office and church, and move to Germantown, Pa. From there he went to Sing Sing, N. Y., then to Quebec, and finally to New York City, where he founded a paper called *The Protestant Vindicator*. His works include *Lectures on Ecclesiastical History* (1822); *Pictures of Quebec* (1830); and *Slavery Illustrated in Its Effects Upon Women* (1834).

BOURNE, HUGH (1772-1852). The founder of the sect of Primitive Methodists. He was born April 3, 1772, at Fordhays Farm, Parish of Stoke-upon-Trent, Staffordshire, England. Originally a preacher among the Wesleyan Methodists, he distinguished himself by the fervor of his religious sentiments, and by the zeal which he displayed for the conversion of the ungodly. His enthusiasm for 'revivals' and open-air meetings, however, received no countenance from the leading clergymen of the denomination to which he belonged. In 1808 Bourne was cut off from the Wesleyan connection for following much the same course of earnest evangelization as Wesley himself had done. He was not, however, alarmed. His preaching was wonderfully acceptable, and he quickly gathered round him many devoted adherents. In March, 1810, a committee of ten members was formed. This may be regarded as the first official organization of the body. The first general meeting of the society occurred the next year, and the name Primitive Methodists was adopted in 1812. The opprobrious name 'Ranters' was given to them by their opponents. In 1823, Bourne published *History of the Primitive Methodists*, a narrative of his labors and those of his coadjutors, and in 1824 founded *The Primitive Methodist Magazine*, which he edited for twenty years. In the course of his life he visited Scotland, Ireland, Canada, and the United States, where his ministrations were attended with great success. He died at Bemersley, in Staffordshire, October 11, 1852. For his biography, consult J. Walford, *Memoirs*, of which only Vol. I. appeared (London, 1855).

BOURNE, VINCENT (1695-1747). An English poet. He studied at Westminster School, and entered Trinity College, Cambridge, in 1714. In 1721 he took his degree of A.M., and subsequently he was appointed usher in Westminster School. He died December 2, 1747. Bourne is remembered for a volume of Latin poems published in 1734. It reached a third and enlarged edition in 1743. Of Bourne, Cowper wrote extravagantly: "I think him a better Latin poet than Tibullus, Propertius, Ausonius, or any of the writers in his way, except Ovid, and not at all inferior to him." Several of his poems were translated by Cowper, and by Charles Lamb, who likewise admired them greatly. Their charm lies in their simplicity and grace. They are marked, too, by a quiet pathos. Special attention may be called to his epitaphs. Consult *Poemata*, ed. Mitford (London, 1840).

BOURNEMOUTH, bōrn'mŭth. A watering-place and winter health resort on the south coast of England in Hampshire, about 30 miles west-southwest of Southampton, on Poole Bay (Map: England, E 6). On account of its sheltered position, surrounding pine woods, and even temperature, it has become a favorite winter resort for persons suffering from pulmonary diseases. The town received its charter of incorporation in 1890. A sanitarium for consumptives was erected in 1855, and there is also a home for convalescents. Bournemouth maintains several parks and winter gardens and a golf course. It has churches, hotels, a library and reading-room, and assembly-rooms, baths, and a pier 800 feet long. Population, in 1901, 47,000.

BOURNONITE, bōōr'non-īt (after Count Bournon, the discoverer). A lead-copper sulphantimonite that crystallizes in the orthorhombic system. It has a metallic lustre, is of a steel-gray color, and is found both massive and in crystals. The chief localities are the Harz Mountains, Bohemia, Chile, Mexico, and, in the United States, various places in Arizona, Arkansas, and Colorado.

BOURNOUS, bu̧r-nōōs'. See BURNOOSE.

BOURRELET, bōōr'lĕt' (Fr., a stuffed cap, worn by children; dimin. of *bourre*, hair, wadding). In elongated projectiles with a pointed head, the imaginary line around the projectile at the junction of the cylindrical body and ogival head. See PROJECTILES.

BOURRIENNE, bōō'ryĕn', LOUIS ANTOINE FAUVELET DE (1769-1834). The secretary and early friend of Napoleon I. He was born at Sens, July 9, 1769. He was educated at the military school at Brienne, where he formed an intimate friendship with Napoleon. The latter, as his influence grew, rapidly advanced Bourrienne, whose avarice, however, brought him into disgrace. Notwithstanding this, he was sent, in 1804, as chargé d'affaires to Hamburg, where he was commissioned to watch over the strict enforcement of the Continental System, but was recalled and obliged to restore a million francs which had been removed by him from the public funds (1810). In revenge, he espoused the cause of Louis XVIII., and he zealously served the Bourbons until the July Revolution. After this his reason failed him, and he died in an asylum at Caen, February 7, 1834. His memoirs concerning Napoleon, the Directory, the Consulate, the Empire, and the Restoration (*Mémoires sur Napoléon*, etc., 10 vols., Paris, 1829) gave many new explanations of the events of the time, but are in many respects untrustworthy. (See BOULAY DE LA MEURTHE.) The work, however, is one which must always constitute an important part of the material of history. A work entitled *Histoire de Bonaparte par un homme qui ne l'a pas quitté depuis 15 ans* has been erroneously ascribed to him.

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BOURRU BIENFAISANT, bōō'rṳ' byăn'-fe-zăn', Le (Fr., The Beneficent Misanthrope). See Goldoni, Carlo.

BOURSAULT, bōōr'sō', Edme (1638-1701). A French satirist and dramatist. Boursault won the favor of Louis XIV. by his *Véritable étude des souverains*, a book written for the education of the dauphin. His dramas, *Esope à la cour* and *Esope à la ville*, were very popular; his tragedies highly esteemed by the enemies of Racine. His *Le Portrait du Peintre*, an attack on Molière for his *Ecole des Femmes*, provoked from Molière the caustic *Impromptu de Versailles*, where Boursault figures by name, as he did in early editions of Boileau's satires in response to his *Satyre des Satyres*. Later Boursault did Boileau a kindness, and his name was erased from that roll of dishonor. Consult Saint-René Taillandier, *Etudes littéraires* (Paris, 1881).

BOURSE, bōōrs, La. See Balzac, Honoré de.

BOUSSA, bōōs'sâ. See Bussang.

BOUSSINGAULT, bōō'săn'gō', Jean Baptiste Joseph Dieudonné (1802-87). A French chemist, distinguished for investigations in agricultural chemistry. He was educated at the School of Mines of Saint Etienne, and went, in the employment of an English mining company, to South America, where, besides rendering important professional services, he served under General Bolivar in the South American war of independence. On his return to France he was appointed professor of chemistry at Lyons. In 1839 he became a member of the Institute and was appointed to the chair of agriculture in the Conservatoire des Arts et Métiers, in Paris. In 1857 he was made commander and in 1876 grand officer of the Legion of Honor. Boussingault published a large number of valuable papers embodying the results of his experimental investigations on various topics in general chemistry and particularly in agricultural science; a collection of his more important memoirs appeared in 1854. Among his highly valuable publications may be mentioned his *Economie rurale* (2 vols., 1844), which was republished in enlarged form under the title *Agronomie, chimie agricole et physiologie* (3 vols., 1860-64; and again in 1887-91); this work was translated into English and German and won for its author a European reputation.

BOUSSU, bōō'sṳ'. A town of Belgium in the Province of Hainaut, situated about seven miles west of Mons, with which it is connected by rail. It contains foundries, smelting-works, and in its vicinity are extensive coal-mines (Map: Belgium, B 4). It was the scene of two engagements between the Austrians and the French on April 28 and on November 4, 1792. Population, in 1900, 10,900.

BOU'STROPHE'DON (Gk. βουστροφηδόν, *boustrophēdon*, from βοῦς, *bous*, ox + στρέφειν, *strephein*, to turn). A word descriptive of a method of writing common among the Greeks of the Sixth Century B.C., in which the lines were written alternately from right to left and from left to right. The method took its name from the resemblance to the winding course taken by oxen in plowing, and was transitional between the earlier method wherein the lines all ran from right to left and the later method wherein they all ran from left to right. See Writing.

BOUTARIC, bōō'tȧ'rēk', Edgar Paul (1829-77). A French historian, born at Châteaudun (Eure-et-Loir). He was appointed chief of the administrative section of the national archives, whose original documents he utilized in preparing his historical studies, which are distinguished by critical care. They deal chiefly with French institutions of the Middle Ages, and include *La France sous Philippe le Bel* (1861) and *Saint Louis et Alphonse de Poitiers* (1870). He also wrote valuable articles for reviews. For his life, consult Bruel and Bonnassieux (Paris).

BOUTEL', Mrs. An English actress of the latter half of the Seventeenth Century. The facts of her life are to a great extent unrecorded, but she appeared at Drury Lane, then the Theatre Royal, about 1663, and before she retired from the stage in 1696 had for years been a popular actress in the London theatres, playing frequently with Betterton, Mrs. Barry, and Mrs. Bracegirdle (q.v.). She was famous, according to an old writer, for her happy presentation of the character of the "young innocent lady whom all the heroes are mad in love with," a part for which her personal charms well fitted her. Among her rôles were Aspatia, in *The Maid's Tragedy* (1666); Melantha, in *Mariage à la mode* (1672); Mrs. Pinchwife, in Wycherley's *Country Wife* (1673); Rosalinda, in *Sophonisba* (1676); Cleopatra, in Dryden's *All For Love* (1678); and Mrs. Termagant, in the *Squire of Alsatia* (1688). Her success on the stage enabled her to retire with a competence before she reached old age. Consult: Genest, *History of the English Stage*, Vol. II. (Bath, 1832); and Doran, *Annals of the Stage*, ed. Lowe, Vol. I. (London, 1888).

BOUTELLE, bou-tĕl', Charles Addison (1839-1901). An American journalist and politician, born at Damariscotta, Maine. He entered the merchant marine, enlisted in the United States Navy in the South Atlantic blockading squadron in 1862, and in command of the *Nyanza*, with rank of lieutenant, participated in the capture of Mobile. In 1870 he became managing editor, and in 1874 proprietor, of the *Bangor Whig and Courier*. He was a delegate to Republican national conventions in 1876, 1880, 1884, and 1888, and was a member of the National House of Representatives from the Forty-eighth to the Fifty-sixth Congress. He was particularly active as a member of the House committee on naval affairs, of which he was chairman in the Fifty-first, Fifty-fourth, and Fifty-sixth Congresses, and did much to promote the construction of the new United States Navy.

BOUTERWEK, bou'tĕr-vĕk, Friedrich (1766-1828). A German philosopher and æsthetical writer, born near Goslar, in the Harz region. He at first studied law at Göttingen, but soon devoted his whole energies to the study of philosophy and of the history of literature. In philosophy, he was at first a zealous follower of Kant, but afterwards inclined more toward Jacobi. He began to give lectures in Göttingen in 1791, and became professor of philosophy in 1797. Of his philosophical writings, *Ideen zu einer allgemeinen Apodiktik* (1799) is the most important; but his great work, on which his reputation really rests, is his *Geschichte der neu-*

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ern Poesie und Beredsamkeit (12 vols., Göttingen, 1801-19). The part relating to Spanish literature is especially valuable, and has been translated into Spanish and much enlarged by José Gomez de la Cortina and Nicolas Hugelde de Molinedo (3 vols., Madrid, 1828). A portion of it was also translated into English and published under the title *History of Spanish Literature* (1823).

BOUTMY, bōōt'mē', EMILE (1835—). A French publicist, born in Paris. He was for a time a journalist, and from 1865 to 1869 occupied the chairs of the history of civilization and of the comparative history of architecture at the Ecole Spéciale d'Architecture. He assisted in founding the Ecole Libre des Sciences Politiques (1872), where for a number of years he held the chair of comparative constitutional history. He was elected a member of the Academy of Moral and Political Sciences in 1898. He has published several excellent works, including *Introduction au cours d'histoire comparée de l'architecture* (1869); *Etudes de droit constitutionnel: France, Angleterre, Etats-Unis* (1885); *Développement de la constitution en Angleterre* (1886); and *Les Latins* (1894).

BOUTO, bōō'tō, or INJIA. A blackish or reddish porpoise-like dolphin (*Inia Geoffroyensis*), about 7 feet long, which abounds in the rivers of the Amazon Valley, going far toward their heads. See DOLPHIN and TUCUXI.

BOUTROUX, bōō'trōō', ETIENNE EMILE MARIE (1845—). A French philosopher and professor at the University of Paris. He was born at Montrouge (Seine). In the thesis entitled *De la contingence des lois de la nature* (1896), he declares that contingency lies at the basis of all nature, the laws of which appear to express necessity. His doctrine rests upon a profound analysis of logical and of causal necessity, and in the distinction between the point of view of quality and that of quantity. Of these two points of view, the former permits us to perceive only permanency, immobility, and fatality, while the latter enables us to distinguish motion, finality, contingency, and progress. Boutroux has also published Vols. I. and II. (1877 and 1882) of a translation of the *Philosophie der Griechen*, by Eduard Zeller.

BOUTS, bouts, DIRK or DIERICK, wrongly styled STUERBOUT (c.1410-75). A Dutch painter, born at Haarlem. He was a pupil of Roger van der Weyden at Louvain, where, in 1467, he painted his earliest authentic work now extant, the decoration of the sacramental altar in the Church of Saint Peter. His other works include "Martyrdom of Saint Erasmus" (Saint Peter, Louvain), "Feeding of Elijah" (Berlin Museum), "Martyrdom of Saint Hippolitus" (Bruges Cathedral), and "Last Supper" (Brussels Museum). His brilliant coloring makes him one of the most significant members of the Flemish School.

BOUTS-RIMÉS, bōō'rē-mā' (Fr., rhymed endings). A kind of verse, the making of which forms a social amusement. Some one of the party gives out the rhymes or endings of a stanza, and the others have to fill up the lines as they best may. Suppose the rhymes prescribed are *wave, lie; brave, die;* the following is one of the ways in which the lines might be completed:

Dark are the secrets of the gulfing wave,
Where, wrapped in death, so many heroes lie;
Yet glorious death's the guerdon of the brave,
And those who bravely live can bravely die.

Addison ridicules the amusement in the *Spectator*, No. 60.

BOUTWELL, GEORGE SEWALL (1818—). An American politician and Cabinet officer. He was born in Brookline, Mass., was admitted to the bar in 1836, and between 1842 and 1851 was seven times chosen to the Massachusetts Legislature. Thenceforth he was a leader of the Democratic Party in his State, was chosen Governor in 1851, and was reëlected the next year. On the repeal of the Missouri Compromise in 1854, he left the Democratic, and assisted in the organization of the Republican Party. In 1862, as commissioner, he organized the new department of internal revenue; in 1863 was elected to Congress, and was twice rechosen. In 1868 he was one of the managers of the impeachment of President Johnson, from 1869 to 1873 was Secretary of the Treasury, and in the latter year was elected United States Senator. In the financial business of the Government, both as a legislator and an executive officer, he had a large share of influence and responsibility. In 1877 he was appointed by President Hayes to prepare a codification of the statutes-at-large. He was an overseer of Harvard and secretary of the Massachusetts board of education, in which capacity he prepared many valuable reports. He wrote *Educational Topics and Institutions* (1859); *Manual of the United States Direct and Revenue Tax* (1863); *The Tax-Payer's Manual* (1865); *Speeches and Papers* (1867); *The Constitution of the United States at the End of the First Century* (1896); and *Reminiscences of Sixty Years in Public Affairs* (1902).

BOUVARDIA, bōō-vär'dĭ-ȧ (named in honor of Bouvard, physician to Louis XIII., and superintendent of the Royal Gardens in Paris). A genus of twenty or thirty American shrubs or perennial herbs, mostly Mexican, of the family Rubiaceæ. Bouvardias are cultivated to a considerable extent as late fall or early winter greenhouse plants. The red or white flowers are long and tubular, four-lobed, and contain four stamens. The fruit is a two-celled capsule. *Bouvardia triphylla* is a favorite in flower borders in Great Britain, producing flowers from June till November.

BOUVART, or **BOUVARD**, bōō'vär', ALEXIS (1767-1843). A French astronomer. In 1804 he was a member of the Bureau of Longitudes. He assisted Laplace in the *Mécanique céleste*, and became a member of the Academy and director of the Observatory. Bouvart was the first to point out the irregularities of the planet Uranus, and the investigation of these irregularities led to the discovery of Neptune by Leverrier and Adams in 1846. He published *Nouvelles tables de Jupiter et de Saturne* (1808), and *Mémoire sur les observations météorologiques faites à l'Observatoire de Paris.*

BOUVET, bōō'vȧ', JOACHIM (c.1662-1732). The founder of the French Jesuit Mission in China, biographer of the famous Manchu Emperor Kang-hi, and initiator of the first survey, by the Jesuits, of the Chinese Empire, which is

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still the basis of our maps. He was born at Mons, in Belgium. Louis XIV. directed him and five other learned Jesuits, including Gerbillon, to proceed to China. They arrived there in July, 1686, and were graciously received by the Chinese Emperor. They succeeded so well in the architectural enterprises committed to them that Kang-hi permitted a church and residence to be built for them inside the Tartar city. The first treaty ever signed by the Court of Peking, with the Russians, for trade, definition of frontier, and their evacuation of Albazin and Manchuria, was negotiated largely through the influence of these missionaries. In 1696 Bouvet was commissioned to bring out from France other missionaries, and in 1699 he returned with ten fellow-Jesuits, among them the learned Parrenin, and the survey of the Empire was begun. Bouvet wrote a biography of Kang-hi and an account in four languages of his various travels, besides his book, *Etat présent de la Chine, avec figures gravées par Griffart* (1697). On the basis of the concessions to Bouvet and Gerbillon, the French laid claims in the Treaty of Tientsin to the land and the rebuilding at Chinese expense of the great Pei Tang or Northern Cathedral in Peking, destroyed by the Boxers. Consult: Michie, *The Englishman in China*, Vol. VIII. (Edinburgh, 1900); and Smith, *China in Convulsion* (New York, 1901).

BOUVIER, bōō'vyā', AUGUSTE AMI OSCAR (1826—). A Swiss Protestant theologian. He was born in Geneva and studied at the University of Berlin (1846), and at that of his native city (1847-51). He was engaged in evangelical work in Paris (1853), and later went to London, where he became pastor of the Swiss church. He occupied the pulpit in the Quartier Saint-Gervais at Geneva in 1857, and four years afterwards was appointed professor of practical theology at the Geneva Academy. During his visit to Germany he became strongly influenced by the views of Schleiermacher, Neander, and others, and in his works, which are characterized by scholarly research and independence of thought, he favors the gradual adoption of the principles of modern liberalism by the Evangelical Party. His principal works are the following: *Epoques et caractères bibliques* (1873); *Le pasteur John Bost* (1882); *Paroles de foi et de liberté* (1882); *Théologie systématique* (1887); *Etude sur le prédication de Jésus* (1892).

BOUVIER, bōō-vēr'; *French pron.* bōō'vyā', JOHN (1787-1851). An American jurist. He was born at Codogno, Italy, but his family emigrated to America when he was very young, and he was brought up in Philadelphia. In 1822 he began to practice law there, and in 1838 became associate judge of the Court of Criminal Sessions. Among his publications are a valuable *Law Dictionary Adapted to the Constitution and Laws of the United States of America, and of the Several States of the American Union* (1839); a new edition of *Bacon's Abridgment of the Law* (1841); and *The Institutes of American Law* (1851), his greatest work.

BOUVINES, bōō'vēn' (anciently, Lat. *Bovinæ*). A small village near Lille in France, noted as the scene of a victory gained by Philip Augustus, on July 27, 1214, over the allied German, Flemish, Dutch, and English forces. By this battle the power of Otho IV. (q.v.) of Germany was crushed and the possession of Normandy, Maine, Anjou, Touraine, and Poitou, wrested by Philip from the English, was assured to the French monarch.

BOVARY, bô'và'rê', MADAME. See MADAME BOVARY.

BO'VATE (from Lat. *bos*, ox, cow), or OXGANG. In the mediæval manor, the space of land an ox could plow in a year; one-eighth of the carucate (q.v.). Often stated as 18 acres.

BO'VEY COAL. See LIGNITE.

BO'VIA'NUM. The name of two ancient towns of Samnium: (1) Bovianum Vetus, capital of the Caraceni, conquered by the Romans in B.C. 298. Now Pietrabbondante, near Agnone. (2) Bovianum Undecimanorum, now Bojano, capital of the Pentri; conquered by the Romans in B.C. 311, it served as their headquarters in the Second Punic War, and as a confederate headquarters in the Social War until taken by assault by Sulla in B.C. 89.

BO'VIDÆ (from Lat. *bos*, gen. *bovis*, ox). A family of ruminants embracing all those having hollow persistent horns in both sexes (save in certain antelopes), combined with certain other anatomical characters. (See RUMINANT.) It includes the domestic animals that 'chew the cud,' and others prominent as game. These are usually divided into five sub-families or sections, viz.: (1) Antelopes (Antilopinæ); (2) goats (Caprinæ); (3) sheep (Ovinæ); (4) musk-oxen (Ovibovinæ); (5) oxen (Bovinæ). In a general way, and by typical examples, these divisions (elsewhere fully treated under their English names) are easily recognized; but when all the representatives of the family are considered they are found to intergrade confusingly, so that some naturalists regard the sub-sections of antelopes (as the Alcephalinæ, etc., see ANTELOPE) as coördinate with the Caprinæ, Ovinæ, etc.; and opinions vary as to their inter-relations; while certain forms, especially the saigas, are by some authorities excluded altogether. The most conspicuous common character is the nature of the horns, which occur in pairs and consist of hollow sheaths of hardened and thickened epidermis (see HORN), covering and supported by bony outgrowths of the skull, varying in form in the different groups. These begin to grow soon after birth, enlarging with the growth of the core, and are perfected at maturity, at which time "the core becomes excavated by the extension into it of the frontal sinuses, whence the ruminants which possess such horns are not infrequently called Cavicornia"; once assumed, they remain permanently throughout life, forming the principal weapons of offense and defense possessed by the tribe. The distribution of the family is extensive, covering all of the Old World except Australasia, but in the Western Hemisphere it is confined to the northern continent, none being indigenous to South America. Most of them, however, show high adaptability for acclimatization, enabling the domesticated species to thrive in almost every part of the world.

BOVINO, bô-vē'nô (anciently, Lat. *Vebinum*). An episcopal city in the Province of Foggia, south Italy, 2100 feet above the sea, and 20 miles southwest of Foggia (Map: Italy, K 6). It has an ancient cathedral and the ruins of an aque-

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duct. Its chief trade is in vine and oil. Population, in 1881 (commune), 7784; in 1901, 7613.

BOW, bō. See ARROW.

BOW (AS. *boga*, a bow to shoot with, because it is bent or bowed; cf. Ger. *Bogen*, bow, from *bengen*, to bend). A slender piece of elastic wood, with slight lateral projections at the ends between which is stretched a quantity of horsehair, used to set into vibration the strings of instruments of the violin class. The oldest instrument played with the bow is the *rebec* (q.v.). The stick forming the bow was at first greatly curved, and a string, or cord, was tied from one end to the other. As the earliest figure of the bow is found in the Anglo-Saxon manuscripts, it is thought to be of British origin, and may have been used in the Sixth Century with the *crwth*, but this is not certain. The bow has been subject to various changes, the most significant of which were effected by Corelli (q.v.), until François Tourte (1747-1835) brought the art of bow-making to perfection, and created a model, which has given him the name of the 'Stradivarius of the bow.' This combines all qualities to follow every degree of tone and expression—lightness, firmness, power, and elasticity. Tourte fixes the length of the violin-bow at 29-29½ inches; that of the viola at 29 inches, and that of a 'cello at 28½-28¾ inches. The stick is usually of Brazilian lancewood, or snakewood, cut to follow the grain, and slightly bent inward by exposure to heat. The nut is of ebony, or tortoise-shell, and contains a screw by which the hair may be tightened or loosened. From 80 to 250 hairs from the tails of horses are used, white for the violin, viola, and violoncello, and black for the double bass. The friction is increased by application of rosin to the hair. For a brief but interesting account of the history and construction of the bow consult Heron-Allen, *Violin-Making as It Was and Is* (London and New York, 1884).

BOW, bou (same word as *bough*, AS. *bōg*, bough, shoulder, Icel. *bōgr*, shoulder) OF A SHIP. A general name for the fore part, or that which breasts the waves. Very often the word is used in the plural, the ship being considered to have starboard and port, or right and left, bows, meeting at the prow or figure-head. A *narrow* or *lean* bow, and a *broad* or *bluff* bow, are seamen's phrases for different shapes of bow, each of which has its own peculiar advantage at sea; the narrow bow will cut more smoothly through the water, but a broad bow bears up more firmly in a high sea. Other forms are the *overhanging* bow, *receding* or *ram* bow, *clipper* bow, *flaring* bow, etc. "On the bow," in sea language, is the position of a distant object when seen over the bow; it implies a sweep of one-quarter of the horizon, embracing about 45 degrees on each side of the prow or head. See BEARING; also SHIP.

BOW (bō) **CHINA.** A peculiar kind of porcelain, manufactured originally in England, at Strafford-le-Bow, whence the name. It is of a fine, milky-white color, and is decorated with imitations of Chinese figures. Many pieces are colored in the style of Dresden china, and a characteristic decoration is a sprig of hawthorn in high relief. There were also reproduced a number of statuettes or small groups of figures modeled more or less upon German designs. The marks on Bow porcelain are usually an arrow, an anchor, a dagger, or a bow and arrow. Bow china dates from 1744, when Edward Heylyn and Thomas Frye obtained a patent for the manufacture of porcelain at Bow. They used an American clay called *unaker*, "the produce of the Cherokee Nation," which seems to have been a kind of kaolin. After grinding and washing to separate the sand and mica, powdered glass was added to the clay in proportions varying from equal parts of clay and glass to one-fifth of glass. The later Bow porcelain sometimes contained as much as 40 per cent. of bone-ash. For the glaze, which was a similar mixture, less of the clay was used. In 1748 Heylyn and Frye obtained another patent for a softer kind of porcelain, which was characterized by a more fusible lead glaze in which *unaker* was not used at all, but a pipe-clay instead. In 1750 Messrs. Weatherby and Crowther obtained possession of the Bow works, and gave them the name of New Canton. The works succeeded for a time, employing 300 operators; in 1763 Crowther, the sole surviving partner, became bankrupt, but he continued to carry on the business till 1775. In that year William Duesbury bought the Bow works and transferred them to Derby. Consult: Bemrose, *Bow, Chelsea, and Derby Porcelain* (London, 1898); Wallis, *Pottery Porcelain of Derbyshire* (London, 1870); Nightingale, *Contributions Toward the History of Early English Porcelain* (Salisbury, 1881); Church, *English Porcelain: A Handbook* (London, 1885). See POTTERY.

BOWDICH, bou'dĭch, THOMAS EDWARD (1791-1824). An African traveler, born in Bristol, England. He was for some time a writer in the service of the African Company, but was selected in 1815 to conduct a mission to the King of Ashantee, of which he published an account in 1819, under the title, *A Mission from Cape Coast Castle to Ashantee*. On his return to Europe he published the *African Committee* (1819), which by its exposures forced the Government to take its African possessions into its own hands. He then proceeded to Paris, where he spent several years perfecting himself in mathematics and natural history. To obtain funds for a new expedition into the interior of Africa, he published a translation of Mollien's *Travels to the Source of the Senegal and Gambia* (1820); *Taxidermy* (1820); *British and Foreign Expeditions to Teembo* (1820); and several other works; and in August, 1822, sailed from Havre. Stopping at Lisbon, he made a careful study of all the Portuguese discoveries, and published a work entitled, *An Account of the Discoveries of the Portuguese in Angola and Mozambique* (1824). He died of fever, on the Isle of Saint Mary, West Africa.

BOWDITCH, bou'dĭch, HENRY INGERSOLL (1808-92). An American physician, a son of Nathaniel Bowditch. He was born in Salem, Mass., and in 1828 graduated at Harvard. After receiving his medical degree at that university in 1832, he spent several years in study in Paris. He was professor of clinical medicine at Harvard from 1859 to 1867; chairman of the Massachusetts State Board of Health from 1869 to 1879; physician at the Massachusetts General Hospital and the Boston City Hospital from 1868 to 1872; and president of the American Medical Associa-

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tion in 1877. He announced a law of soil-moisture as one of the principal causes of consumption in New England, and was the first to practice the operation of thoracentesis, or puncturing of the chest cavity, in the case of pleural effusions. He was a member of the National Academy of Sciences. The following are some of his principal publications: *Life of Nathaniel Bowditch* (1865); *The Young Stethoscopist* (1848); *Public Hygiene in America* (Centennial address, Philadelphia, 1876); and translations of *Louis on Typhoid* (1836), *Louis on Phthisis* (1836) and *Maunoir on Cataract* (1837).

BOWDITCH, Henry Pickering (1840—). An American physician, born in Boston. He graduated at Harvard in 1861, and served throughout the Civil War, during which he attained the rank of major of volunteers. He graduated at the Harvard Medical School in 1868, and afterwards studied medicine in Germany and France. In 1876 he became professor of physiology at the Harvard Medical School.

BOWDITCH, Nathaniel (1773-1838). An American astronomer and mathematician, born in Salem, Mass. He showed at a very early age an inclination for mathematics, though he was bred to his father's trade of a cooper, and was afterwards apprenticed to a ship-chandler. He acquired Latin that he might study Newton's *Principia*. He particularly devoted himself to the study of the practical applications of science. He went as supercargo of a merchant ship in several long voyages, and added a thorough practical acquaintance with navigation to a theoretical knowledge of it. His work, *The New American Practical Navigator* (1802), was received with great favor. He published also an admirable translation of Laplace's *Mécanique céleste* (2 vols., Boston, 1829), to which he added valuable annotations. These works obtained for him marks of honor from scientific societies in Great Britain, and led to his being called to the professorship of mathematics and astronomy in Harvard College, which position, however, he declined, in order to enter the executive council of the State. He afterwards became manager of a life insurance association, president of the Mechanics' Institute, and president of the Academy of Arts and Sciences in Boston. Consult H. I. Bowditch, *Memoir of Nathaniel Bowditch* (Boston, 1839).

BOWDITCH'S PRACTICAL NAVIGATOR. A compendium of information for navigators. It contains explanations of all the ordinary methods of determining the ship's position at sea, together with all the tables necessary for using them; also descriptions of instruments used in navigation, methods of making hydrographic surveys, charts, etc. The copyright of this work was purchased by the United States Government, and it is now published and issued by the Hydrographic Office, United States Navy. It has been several times revised, and a considerable amount of matter has been added.

BOWDLERISM, boud'lĕr-ĭz'm. A term used to denote literary prudery, or over-nice expurgation. It is so named from Thomas Bowdler (1754-1825), who, in 1818, published *The Family Shakespeare* in 10 volumes, "in which nothing is added to the original text; but those words and expressions are omitted which cannot with propriety be read aloud in a family." The work had a large sale. Bowdler also 'purified' Gibbon.

BOWDOIN, bō'd'n, James (1727-90). An American politician. He was born in Boston, of French Huguenot descent; graduated at Harvard in 1745, and was subsequently a representative in the General Court, a State senator, and a councilor. He was an early opponent of English oppression, and in 1775 was chosen president of the Colonial Council. In 1778 he presided over the Massachusetts Constitutional Convention, and in 1785 succeeded John Hancock as Governor. In this capacity he proved his executive ability by his energetic measures in the suppression of 'Shays's Rebellion' (q.v.). In 1789 he was a member of the convention that ratified the Federal Constitution. Bowdoin was one of the founders, and the first president, of the Academy of Arts and Sciences, to which he gave his library. He also left a legacy to Harvard College, and was a liberal patron of the Massachusetts Humane Society. The oldest college in Maine has been named after him.

BOWDOIN, James (1752-1811). An American public man and philanthropist, born in Boston, the son of Governor Bowdoin. He graduated at Harvard, studied also at Oxford, and traveled in Europe, returning to America soon after the battle of Lexington. In 1805 he was United States Minister to Spain. He left to Bowdoin College 6000 acres of land and £1100, the reversion of the island of Naushon, where he had his summer home, a large library and an extensive collection of philosophical apparatus.

BOWDOIN COLLEGE. The oldest seat of learning in Maine. It was chartered in 1794 by Massachusetts, and was named after James Bowdoin, Governor of Massachusetts, of which State Maine was formerly a district. The college opened at Brunswick, Cumberland County, in 1802, with Joseph McKeen, D.D., a Dartmouth graduate, as its first president. From the Hon. James Bowdoin, the son of Governor Bowdoin, the college received valuable gifts of land, money, books, and paintings. The present buildings of the college, representing a value of $600,000, include King Chapel, the Walker Art Building, the Searles Science Building, Memorial Hall, the Hubbard Library, and a gymnasium, observatory, and dormitories. The course of study leading to the degree of A.B. is based on a knowledge of the ancient and modern languages and mathematics, and includes such other courses as are usually given in smaller colleges of the first class. Connected with Bowdoin College is the Medical School of Maine, organized in 1820. The government of Bowdoin is administered by thirteen trustees, of whom the president and treasurer of the institution are ex-officio members, and by forty overseers. Among noted graduates of Bowdoin, who have lent prestige to its name, may be mentioned Nathaniel Hawthorne, Henry W. Longfellow, William Pitt Fessenden, Franklin Pierce, Sergeant S. Prentiss, John P. Hale, Chief Justice Melville W. Fuller, Thomas B. Reed, and Gen. O. O. Howard. Among the benefactors of the college may be mentioned Mrs. Valeria G. Stone, Mr. Henry Winkley, Mr. E. F. Searles, Mr. Daniel B. Fayerweather, Gen. Thomas H. Hubbard, Hon. W. W. Rice, Miss Sophia Walker, and Harriet S. Walker.

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In 1900 Bowdoin had thirty-four professors and instructors, 252 academic students, and 104 medical students. At the same time the library contained about 70,000 volumes. The college is non-sectarian, but closely affiliated with the Congregational denomination.

BOWELL, bou'el, MACKENZIE (1823—). A Canadian statesman. He was born in England, but removed to Canada in 1833, received a common-school education, and became editor and proprietor of the Belleville *Intelligencer*. He served in the Dominion Parliament from 1867 to 1892, as a member of the Privy Council, and as Minister of Customs. He became Minister of Militia and Defense in 1892, and from 1894 to 1896 was Premier. Later he was leader of the Conservative Opposition in the Senate (1896-97).

BOWEN, bō'en, FRANCIS (1811-90). An American author, born in Charlestown, Mass. He graduated at Harvard in 1833, and became instructor there in intellectual philosophy and political economy. He was proprietor and editor of the *North American Review* from 1843 to 1854, when he was appointed to the Alford professorship of natural religion, moral philosophy, and civil polity at Harvard. In philosophy and metaphysics he opposed the views of Cousin, Comte, Fichte, Kant, and Mill, and upheld those of Locke and Berkeley. Among his publications are: *Lectures on the "Application of Metaphysical and Ethical Science to the Evidences of Religion"* (1849); *Lectures on Political Economy* (1850); *Critical Essays on the History and Present Condition of Speculative Philosophy* (1842); *Documents of the Constitution of England and America, from Magna Charta to the Federal Constitution of 1789* (1854); *Principles of Political Economy* (1856); *Gleanings from a Literary Life, 1838-80* (1880); *A Layman's Study of the English Bible* (1886), and many essays and reviews.

BOWEN, Sir GEORGE FERGUSON (1821-99). An English administrator. He was born in Ireland and was educated at Oxford. He served for a time as president of the University of Corfu, and afterwards became chief secretary of the Government of the Ionian Islands (1854); first Governor of Queensland (1859), and Governor of New Zealand (1868), where he had the difficult task of bringing the Maori War to an end. He was Governor of Victoria from 1873 to 1879; of Mauritius from 1875 to 1883, and of Hong Kong from 1883 to 1887, when he retired on a pension. In 1888, however, he was royal commissioner at Malta to arrange for the new constitution granted that island. He wrote *Ithaca* (1850); *Murray's Handbook for Travelers in Greece* (6th ed., London, 1896); *Mount Athos, Thessaly, and Epirus* (1852); and *Thirty Years of Colonial Government* (1889), containing a full account of his public services.

BOWEN, HENRY CHANDLER (1813-96). An American publisher; born in Woodstock, Conn. He received an academic education; came to New York in 1833, and established the firm of Bowen & McNamee, dry-goods and silk merchants. In 1848 he assisted in founding the New York *Independent*, of which he became publisher, proprietor, and editor. In 1852 his firm was boycotted in the South on account of his public denunciation of the Fugitive Slave Law, and became famous for the statement that the firm had "its goods but not its principles for sale."

BOWEN, JOHN WESLEY EDWARD (1855—). An American theologian; born in New Orleans. He is a graduate of the universities of New Orleans and Boston, and was professor of ancient languages at Central Tennessee College (1878-82); professor of church history and systematic theology at Morgan College, Baltimore (1889-91); professor of Hebrew at Howard University, Washington (1891). In 1888 he became professor of theology in the Gammon Theological Seminary, South Atlanta, Ga. He has also held several prominent pastorates and has been secretary of various church and missionary organizations. His writings include: *Africa and the American Negro; The Catholic Spirit of Methodism; The Theology and Psychology of the Negro Plantation Melodies; An Apology for the Higher Education of the Negro.*

BOWENITE, bō'ĕn-īt. A massive variety of serpentine, of an apple-green or greenish-white color, that is found in Smithfield, R. I., and in other serpentine localities. It was named after George T. Bowen, who described it in 1822.

BOWER, bou'ĕr, ARCHIBALD (1686-1766). A Scottish ecclesiastical historian. He was born in Dundee, was educated at the Scotch College in Douai, and in 1706 was admitted to the Jesuit order. He studied divinity in Rome and Arezzo, and from 1723 to 1726 was a member of the Court of the Inquisition in Macerata. In the latter year he returned to England and entered the Established Church. In 1745 he was re-admitted to the Jesuit Order, but in 1747 professed again to have left the Church of Rome. He was severely attacked for his changes of religion, and for the alleged lack of originality displayed in his *History of the Popes* (1748-66), his best-known work, and the most complete of the sort in the language. It was reprinted in Philadelphia in 1844-45, with a continuation in 3 vols. by Dr. S. H. Cox.

BOWER, FREDERICK ORPEN (1855—). An English botanist. He was born at Ripon, Yorkshire, and was educated at Trinity College, Cambridge. In 1882 he was appointed first lecturer in botany in the Normal School of Science (now Royal College of Science), and in 1885 he became regius professor of botany in the University of Glasgow. During the following four years he also acted as examiner in the University of London. His works include a *Course of Practical Instruction in Botany*, in collaboration with Professor Vines (1891); *Practical Botany for Beginners* (1894); a translation, prepared in collaboration with Dr. D. H. Scott, of the *Comparative Anatomy of Phanerogams and Ferns* by De Bary (1884), and numerous memoirs published by the Royal Society and the Linnæan Society.

BOWER (or **BOWMAKER**), WALTER (?1385-1449). An abbot of the monastery of Saint Columba, Island of Inchcolm, Firth of Forth, and one of the authors of the *Scotichronicon*. He began about 1440 his continuation of John Fordun's *Chronica Gentis Scotorum*. He divided the work into sixteen books, of which the first five and a part of the sixth were largely by Fordun, and carried it down to the death of James I. (1437). The *Scotichronicon*, completed

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in 1447, he subsequently abridged into the manuscript now contained in the Advocates' Library of Edinburgh, and known as *The Book of Cupar*. There is an edition of the *Scotichronicon*, prepared by Walter Goodall from the Edinburgh College Library manuscript, and published at Edinburgh in 1759. Consult Tytler, *Lives of Scottish Worthies*, Vol. II. (London, 1845).

BOWERBANK, bou'ĕr-băṅk, JAMES SCOTT (1797-1877). An English geologist; born in Bishopsgate, London. In 1836 he associated himself with several friends in originating 'The London Clay Club' for the examination of fossils of the Tertiary formation, and the preparation of a list of the species found in it. In 1840 he published a volume on the *Fossil Fruits of the London Clay*, which is still regarded as a standard work. In 1847 he was an associate founder of the Palæontographical Society. On his retirement from active life he devoted himself to the completion of his great work on sponges, to which subject he had for many years devoted considerable study. He was an indefatigable collector, and in 1864 his collection was bought by the British Museum, of which it now forms a well-known and important division. In addition to numerous scientific papers published by him in the *Journal of the Microscopic Society*, the *Journal of the Geological Society*, etc., he is the author of the interesting contributions entitled "The Pterodactyles of the Chalk," in *Proceedings of the Zoölogical Society*, and of contributions to a *General History of the Sponaidæ*.

BOWER-BIRD. One of certain Australasian birds remarkable for making ornamented bower-like structures, locally known as 'runs,' as places of resort, especially in the breeding season. They are members of the family of the birds of paradise, the numerous genera and species forming the sub-family Ptilonorhynchinæ. All are of moderate size and plain plumage, subsist mainly upon fruits, and breed in trees, constructing rather rude nests for their eggs, for their terrestrial bowers are not nesting-places, but 'playhouses.' These birds were first described in 1840 by Dr. John Gould, the ornithological explorer of Australia, but much new information has since been gained. Several species are usually living and working in the Zoölogical Gardens in London and elsewhere, and specimens of their curious structures are displayed by several large museums in Europe and America.

The most familiar species is the satin-bird (*Ptilonorhynchus violaceus*), of the southern part of Australia. It is about the size and somewhat the shape of a jackdaw, but the sexes are dissimilar, the males having a plumage of satiny black, while the females and young are grayish green. In manners they exhibit great alertness and an almost irrepressible activity. "In their native wilds," writes an observer to *The Field*, of London, "the site chosen for the playground is some open spot in the most retired parts of the New South Wales forests. There, in the neighborhood of berry-bearing plants, and scrubs studded with enormous fig-trees (to the fruit of which they are especially partial), having cleared the turf of all inharmonious objects and dead leaves, the male constructs a dome-shaped gallery, open at either end, and about a foot long, with the floor and sides formed of sticks and twigs. Those used for the latter are longer and more slender, and so arranged that they lean inwards, nearly meeting overhead. The floor, or platform, in which the sides are firmly planted, is sometimes ornamented with a few feathers, but around the entrance are scattered every variety of decorative material, such as bright-colored feathers, bones, and shells, which are often brought from long distances in the bush for this purpose; and scarcely a day passes without the birds making some fresh arrangement or adding to their store of curios. Like too many of their crow-like relatives, they pay little regard to the Eighth Commandment; and Mr. Gould says that the natives are in the habit of searching their arbors for anything that has been lost or dropped in the bush, and frequently recover missing articles in this way. When this summer-house is complete, little 'at homes' are given daily, at which the males meet and pay their court to the females, and, with ruffled feathers and many bows and scrapes, go through the most absurd, not to say stately, dance, for the edification of their lady-loves, or at other times pursue them through the gallery with the utmost glee in a wild game of 'hide and seek.' The captives in zoölogical gardens seem never at rest, and when not feeding or flirting are constantly engaged in flying backward and forward through their aviary. The male never appears content with his architecture, and amuses himself by constantly pulling down his summer palace and rebuilding it in improved style."

The regent-bird (*Sericulus melinus*), which has a rather limited range in the region north of Sydney, and breeds along Brisbane River, is a near relative, but the fully plumaged males have rich yellow markings on the head, neck, and wings; and it builds a bower resembling that of the satin-bird, but decorated exclusively with snail-shells. It is so pugnacious that the males often kill one another in their fights at the nuptial season. Allied Queensland species of the genera Scenopœus and Ailurœdus are not known to build bowers, but clear wide spaces of ground on which to display themselves, and ornament them with leaves, renewed as fast as they decay. To the latter genus belong the 'catbirds' of southern Australia.

The spotted bower-birds of the genus Chlamydera form still more elaborate runs. There are several species, all characterized by the pink, collar-like marking on the necks of the males, which inhabit bushy districts in southern Australia and northern New Guinea. Their structures take the form of avenues about 3 feet long and 8 inches broad inside; the walls of upright twigs, rising from a dense platform, bend in at the top, but do not meet. This avenue and the ground near it are always strewn with hundreds of white pebbles, shells, bleached bones, and other bright objects, which the birds delight to gather, arrange, and rearrange.

Of a different and even more remarkable character are the structures of the related gardener-bird (*Amblyornis inornatus*) of New Guinea, first described by the Italian naturalist Dr. O. Beccari, in the *Annals of the Museum of Genoa* (Vol. IX., p. 382, Pl. 8). Choosing a level spot in the forest, this bird clears a space around a sapling the size of a walking-stick, and heaps up around its base a cone of mosses about 18 inches in height. Around this is built a conical hut, made by leaning from the ground to the central

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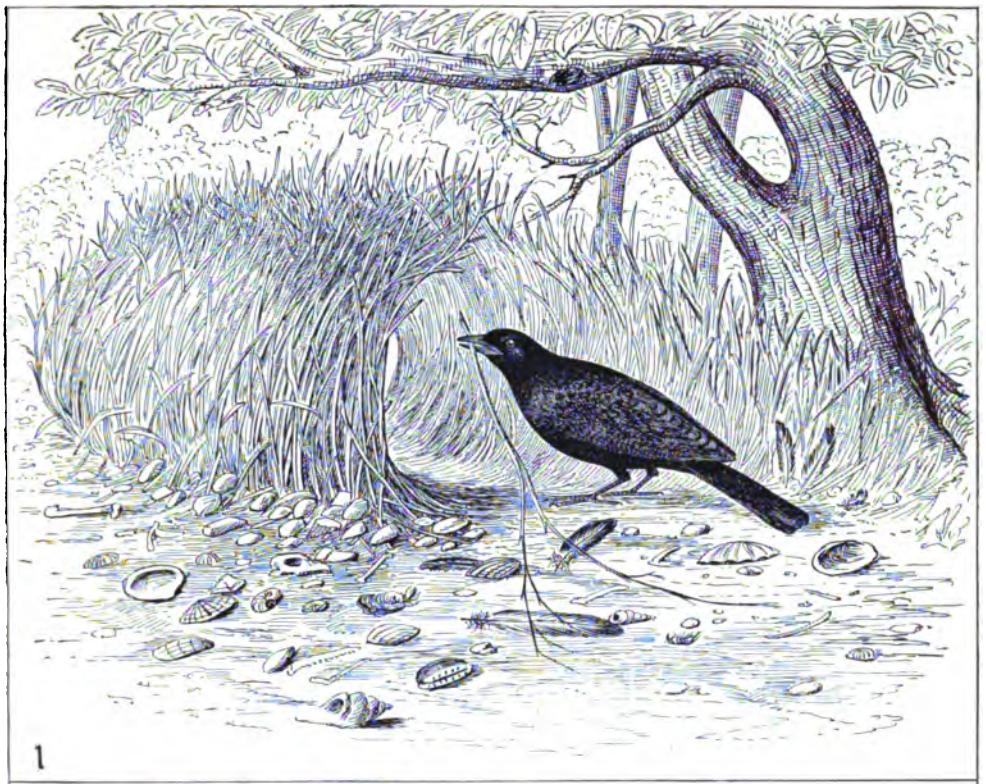
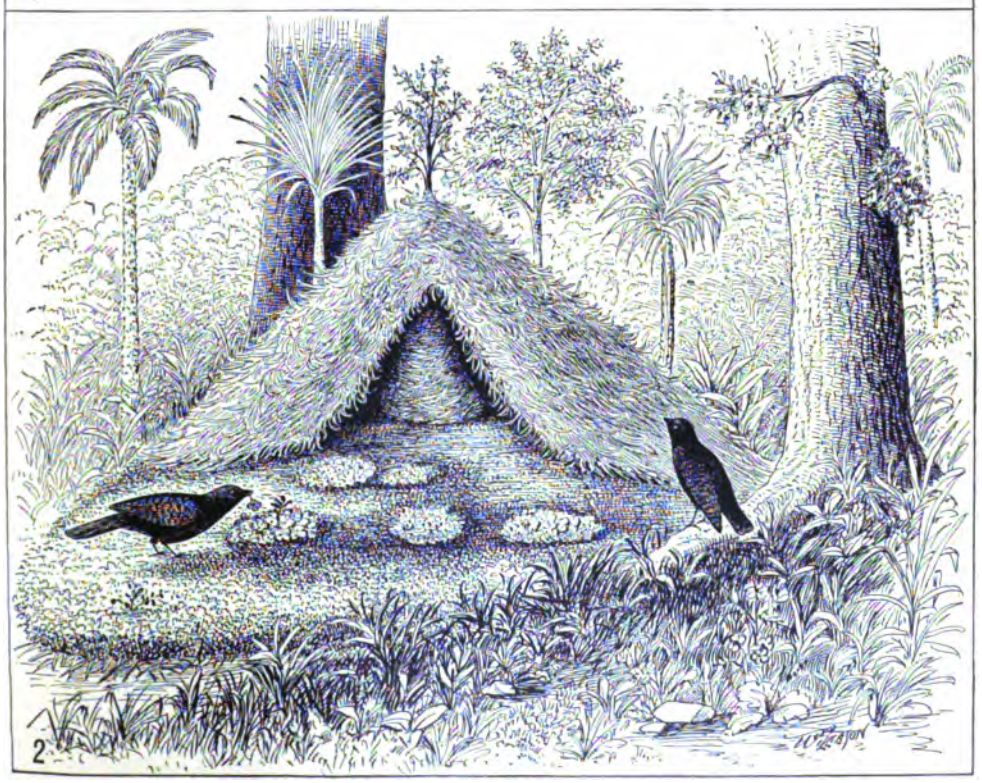
BOWER BIRDS





1. BOWER OF SATIN BOWER BIRD (Ptilonorhynchus holosericeus).

2. HUT AND GARDEN OF THE GARDENER BOWER BIRD (Amblyornis inornatus).

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pillar, at a little distance above the interior cone, thin, straw-like stems of an epiphytal orchid, which serve as rafters; these are interwoven and well thatched with others of the same sort, forming a 'wigwam' open in front, but covering a gallery running around the pillar. The orchids of which it is composed retain their leaves and remain alive and blooming for a long while; and Dr. Beccari believes that they are chosen by the birds on this account. "But," he says, "the æsthetic tastes of our 'gardener' are not restricted to the construction of a cabin. Their fondness for flowers and for gardens is still more remarkable. Directly in front of the entrance to their cabin . . . is a miniature meadow of soft moss, transported thither, kept smooth and clean and free from grass, weeds, stones, and other objects not in harmony with its design. Upon this graceful green carpet are scattered flowers and fruit of different colors in such a manner that they really present the appearance of an elegant little garden. . . . Showy fungi and elegantly colored insects are also distributed about the garden and within the galleries of the cabin. When these objects have been exposed so long as to lose their freshness they are taken from the abode, thrown away, and replaced by others." Each of these huts and its garden are believed to be the work of a single pair, or perhaps of the male alone; and they seem to be utilized year after year.

Not less remarkable is the bower of birds of the genus Prionodura, described by Mr. Devis in the *Transactions* of the Royal Society of Queensland for 1889 as a collection of huts looking not unlike a dwarfed camp of the aborigines.

The purpose of these structures is perhaps best characterized by the term 'playhouse,' and they are merely the carrying out architecturally of the same feeling which leads many other birds to resort to certain spots, and in some cases to prepare them, by scratching or other simple efforts, for the purpose of playing with one another, or of going through the dancing and antics that are a part of the method of courtship. This phase of bird life has been treated more or less by all writers upon birds, and especially for those of the North Atlantic shores by Edmund Selous in *Bird Watching* (London, 1901); but the briefest general array of such facts is contained in Chapter XIII. of Darwin's *Descent of Man*. Many birds show a distinct preference for bright objects about them, and adorn their nests for no other apparent reason than æsthetic enjoyment; and the fondness shown by the bower-birds for pretty ornaments seems only the highest development of this wide tendency. They replace dying leaves and faded flowers with fresh ones, and move about and arrange their shells and pebbles precisely as if it were an amusement and mental gratification to 'play' with them and with each other in a nicely prepared place.

BOWER OF BLISS, The. A fair garden wherein is contained all that appeals to the sensual in man's nature. It is the home of Armida in Tasso's *Jerusalem Delivered* and of Acrasia in Spenser's *Faerie Queene*. In the latter poem it is situated on a floating island and is described in Book II.

BOWERS, bou'ĕrz, Elizabeth Crocker (1830-95). An American actress. She was born at Stamford, Conn., and first appeared on the stage in 1846, at the Park Theatre, New York. The next year she was married to David P. Bowers, an actor, with whom she went to Philadelphia and remained there till his death in 1857, playing at the Walnut Street and Arch Street theatres. In 1861, after her marriage to Dr. Brown, of Baltimore, she went to London and made a great success as Julia in *The Hunchback*, and as Geraldine D'Arcy in *Woman*. Returning to New York in 1863, she played for a time at the Winter Garden. Among her favorite parts were Juliet, Lady Macbeth, Marie Antoinette, and Lady Audley. After the death of Dr. Brown (in 1867) she married J. C. McCollom, with whom she repeated many of her popular rôles. Her subsequent retirement at Philadelphia was interrupted by a return to the stage, in 1886, for several years. Under A. M. Palmer's management she appeared in *Lady Windermere's Fan* (1893), and later she supported Rose Coghlan and Olga Nethersole. Her death occurred in Philadelphia, where she made her home.

BOWERS, Theodore S. (1832-66). An American soldier, born in Pennsylvania. He entered the army in 1861, was appointed aide-de-camp to General Grant, and after the surrender of Vicksburg became assistant adjutant-general of volunteers, serving in the field and at Washington, on General Grant's staff. He was killed by an accident in 1866. For gallant service he was brevetted lieutenant-colonel, colonel, and brigadier-general, U.S.A.

BOW'ERY, The (Dutch *bouwerij*, farming, farm; from *bouwer*, farmer, Ger. *Bauer*, rustic, peasant, Eng. *boor*). A broad avenue in New York City, parallel with Broadway, extending from Chatham Square to the junction of Third and Fourth avenues at Cooper Union. Its original name, the *Bouwerie*, was derived from the estates of the Governor, Peter Stuyvesant, whose farm and orchards, embracing the region lying about the upper part, were called the Great Bouwerie. Once notorious as the rendezvous of the lawless 'Bowery Boy,' the street, at the present time, is characterized by heterogeneity of population, and a multitude of questionable resorts and cheap shops.

BOWFIN, bō'fĭn'. A peculiar fish of the Mississippi Valley and Great Lakes, representing an order (Cycloganoidea or Halecomorphi), and a family (Amiidæ), having affinities with both ganoid and isospondylous fishes. Only a single living species remains—the bowfin or mudfish (Amia calva), of sluggish streams throughout the central United States, from Lake Superior to Florida and Texas, but the group is largely represented by fossil forms; and, according to Jordan, "it is probable that the ancestors of the Isospondyli [shad, salmon, and their relatives] are to be found among forms allied to the existing Halecomorphi." The bowfin attains a length of about 2 feet and a weight of 12 pounds, and, like its allies, the garfishes, is covered with hard, round scales; the fore part of the body is cylindrical, the head stout and blunt, and the mouth filled with powerful teeth. It is exceedingly hardy, enduring absence from the water for a long time, as well as grievous injury; hence the young are the favorite live bait of anglers in the Mississippi Valley, and make interesting captives in an aquarium, where, however, nothing else but snails can remain alive. These fish are

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strong, active, voracious, and gamy, taking a trolling spoon with avidity and resisting capture strongly. They feed upon all sorts of small aquatic creatures. They spawn late in spring, in warm shallows, among water-weeds, where the guarded eggs hatch in eight or ten days, after which the young remain with the parents for two or three weeks, during which time they will retreat into their mother's capacious mouth for protection when danger threatens them. They do not venture into open lakes or deep water until the following season. The flesh is considered hardly eatable in the Northern States, but is a favorite with the negroes of the South. Other Northern names for this fish are dogfish and lawyer; and in the South it is known as mudfish and grindle, or John A. Grindle. Consult: Hallock, *Sportsman's Gazetteer* (New York, 1877), and Goode, *Fishery Industries, Section I.* (Washington, 1884). See Plate of STURGEONS, PADDLEFISH, and BOWFIN.

BOWHEAD, bō'hĕd'. A whalebone whale, especially the great Greenland species, in reference to the arched outline of its head. See WHALE.

BOWIE (bō'ē) **KNIFE.** A form of hunting-knife often carried by pioneers of the Southwest, and improved by Col. James Bowie, who has been wrongfully represented as a bully and a duelist.

BOW (bō) **ISLAND.** An island of coral formation in the southern Pacific, near the centre of, and the largest in, the Paumotu or Low Archipelago (Map: World, L 7). It is about 30 miles long and 5 miles broad.

BOWKER, RICHARD ROGER (1848—). An American editor and writer. He was born in Salem, Mass., and graduated at the College of the City of New York in 1868. He was a leader in the Independent Republican or 'Mugwump' movement in 1879. His publications include *Work and Wealth; Economics for the People; Copyright: Its Law and its Literature*, and the *Annual American Literary Index.*

BOWLDERS. See BOULDERS.

BOWLES, CAROLINE. See SOUTHEY.

BOWLES, bōlz, FRANCIS TIFFANY (1858—). An American naval constructor. He was born in Springfield, Mass., graduated in 1879 at the United States Naval Academy, studied at the Royal Naval College, Greenwich, England, and was appointed to the United States naval advisory board in 1882. He was long director of repairs and construction in the Norfolk (Va.) and Brooklyn (N. Y.) navy-yards, and became chief constructor of the United States Navy. In 1901 he was made a rear-admiral. He has been closely connected with the building of the new United States Navy.

BOWLES, SAMUEL (1826-78). An American journalist, born in Massachusetts. For more than thirty years he was editor of the *Springfield* (Mass.) *Republican*, which had been established by his father, the elder Samuel Bowles, and which soon became one of the leading journals in New England. He traveled widely over the United States, and was always warmly interested in political affairs, though never holding office. As a practical editor, Bowles stood in the first rank, satisfied with nothing less than the best work, sparing neither his own nor his subordinates' strength, nor hampered in his work by either fear or friendship. He was an accomplished and fascinating conversationalist, cosmopolitan in taste and liberal in opinion. His travels gave rise to the volumes *Our New West* (1869) and *The Switzerland of America* (1869), which, with his numerous editorial writings, showed him a master of clear and vigorous English. Consult Merriam, *The Life and Times of Samuel Bowles* (New York, 1885).

BOWLES, WILLIAM LISLE (1762-1850). An English poet. He was born September 24, 1762, at King's Sutton, Northamptonshire, where his father was then vicar. He received his education at Winchester School, and at Trinity College, Oxford. In 1804 he became vicar of Bremhill, Wiltshire, and a prebendary of Salisbury Cathedral. Here he spent the remainder of his long life. He died at the Close, Salisbury, April 7, 1850. His poetical career began with the publication, in 1789, of *Fourteen Sonnets, Written Chiefly on Picturesque Spots During a Journey.* This unpretending volume was received with extraordinary favor; the sonnets were fresh and natural, and to many minds all the more charming because of the contrast which they presented to the style of poetry which had long been prevalent. Coleridge, Wordsworth, and Southey were among their enthusiastic admirers; and through the influence which he exercised over them, Bowles may be regarded as the founder of a school of English poetry, in which their names soon became greater than his own. The subsequent poetical works of Bowles are very numerous, of which "The Spirit of Discovery" and "The Missionary" are generally regarded as the best of his longer blank-verse poems. Bowles was also an antiquarian of repute; and as a literary critic he was the cause of a memorable controversy on the question whether Pope was a poet. In his edition of Pope's works (1806), he was very severe in his strictures. Byron, Campbell, and others replied. Consult Gilfillan, *Poetical Works*, with memoir (ed. Edinburgh, 1855).

BOWLEY, bou'lĭ, Sir JOSEPH. 'The Father and Friend of the Poor,' in Dickens's short story, *The Chimes.* He is a hypocritical member of Parliament.

BOWLINE, bō'lĭn (*bow* of a ship + *line*). A rope fastened near the middle of the perpendicular edge of the square sails by three or four subordinate ropes called *bridles.* It is employed to tighten the edge of the sail and make it lie flatter when sailing close to the wind.

BOWLING, bō'lĭng, TOM. (1) The name of a sailor in Smollet's *Roderick Random.* (2) The same, in a song of that title by Charles Dibdin.

BOWLING GREEN. A city and the county-seat of Warren County, Ky., 114 miles southwest of Louisville; on the Barren River, at the head of navigation, and on the Louisville and Nashville Railroad (Map: Kentucky, E 3). It is in a fertile agricultural region producing corn, hay, wheat, oats, and tobacco, and has an important trade also in mules and hogs, and its horse market is one of the largest in Kentucky. The city has two parks, the larger of 42 acres, interesting from an historical point of view, and contains Ogden College (non-sectarian), opened in 1877; Potter College for Women (non-sectarian), opened in 1889; Southern Normal School; Saint Columba's Academy, and a business college. Bowling Green was first incorporated in

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1812, and is now governed under a charter of 1893, which provides for a mayor, elected every four years, and a city council elected on a general ticket. The waterworks and electric-light plant are owned and operated by the municipality. During the Civil War the place was regarded by the Confederates as of considerable strategic importance. Population, in 1890, 7803; in 1900, 8226.

BOWLING GREEN. A city and the county-seat of Pike County, Mo., 90 miles northwest of Saint Louis; on the Chicago and Alton and the Saint Louis and Hannibal railroads (Map: Missouri, E 2). It has a flour-mill and a pipe-factory, and is the seat of Pike College (non-sectarian), founded in 1881. Settled in 1820, Bowling Green was incorporated in 1838. Its present government is administered under general statutes for cities of the fourth class, which provide for a mayor, elected biennially, and a board of aldermen. Population, in 1890, 1564; in 1900, 1902.

BOWLING GREEN. A city and the county-seat of Wood County, Ohio, 22 miles south of Toledo; on the Cincinnati, Hamilton and Dayton and the Toledo and Ohio Central railroads (Map: Ohio, C 3). Among the more notable features of the city are a park, and the court-house and city-hall buildings. It is in an agricultural district and carries on a trade in grain and general farm produce, and is the centre of a great oil and natural-gas region, the chief source of prosperity. There are also foundries, and cut-glass and canning factories. The city has waterworks, gas plant, and electric-light plant, and a unique feature in the form of a hot-water heating plant, all owned and operated by private companies. Settled in 1832, Bowling Green was incorporated in 1854. The government, under the revised charter of 1901, is in the hands of a mayor, elected every two years, and a municipal council. Population, in 1890, 3467; in 1900, 5067.

BOWLING GREEN. A triangular strip of land at the foot of Broadway, New York, containing a small oval park. Early in the Dutch occupancy of New York the place was laid out as a village green and parade-ground. Facing it on the south stood Fort Amsterdam, built in 1626 and torn down in 1787, when a mansion was erected on its site for Washington, who, however, did not occupy it, and it became the official residence of Governors Clinton and Jay. The Governor's mansion in turn gave way to a row of fine brick residences, the famous 'Mushroom Row,' in recent years occupied by steamship offices, and torn down in 1901 to make room for the new custom-house. In Colonial times the Bowling Green was surrounded by aristocratic dwellings, the site of which is now occupied by lofty office buildings. In 1770 the citizens erected on the Green an equestrian statue of George III., which was pulled down after the reading of the Declaration of Independence on July 9, 1776, and converted into 48,000 leaden bullets for use against the English.

BOWLS, bōlz (Fr. *boule*, It. *bolla*, *bulla*, from Lat. *bulla*, bubble, a round object). A game played upon a smooth, flat piece of turf. The players arrange themselves in sides, usually of three or four each, and each man is provided with two bowls. The bowls are made of lignum-vitæ wood, of varying size and weight, nearly round, and with a bias to one side. A smaller ball, generally a perfect sphere, and white, is placed at one end of the bowling-green; this is termed the *jack*, and the aim of the players, who stand at the other end of the green, is to so send their bowls that they may lie as near as possible to the jack. The side whose bowls are nearest the jack reckon one point for each bowl so placed. Various scores make game, according to mutual arrangement beforehand. Bowls are biased or weighted on one side, that the player may reach the jack by a curved instead of a straight course, an expedient which the nature of the game renders particularly desirable. A bowl is played *forehand* when it is so placed in the hand and delivered as to cause it to approach the jack with a curve from the right; and in order to attain this curve the bowl must be held so that its bias is on the left or in-side. *Backhand* is the reverse. If a bowl goes out of bounds without touching the jack it cannot count in the scoring of that end; but if it strikes the jack and then rolls out of bounds, it reckons as if on the green. When the jack is carried off the green by a ball it is usually lifted and placed an the green as near as possible to its position in the ditch.

A form of bowling is practiced among the pitmen and other workmen of the north of England, in which stone or concrete balls are rolled over a course one-half mile to one mile long, the object being to cover the distance in the fewest possible throws.

Bowling.—Bowling on alleys has developed a greater variety of games than bowling on the green. The principal alley game is tenpins, a name by which bowling itself is sometimes known. The pins are set up so as to form a triangular figure, at the end of an alley whose regulation size is 60 feet in length and 42 inches in width. The aim is to bowl down all the pins in the three balls or frame which each player rolls in turn. Should the player knock down all the pins with the first ball he is credited with a *strike*, and may add to the 10 thus scored the number of points made on the next two balls that he may roll. If the pins all fall in two rolled balls the player scores a *spare*, and to the 10 thus scored may add the points gained in the next ball he may roll. When a player makes a large number of strikes and spares in a game the scoring becomes somewhat complex, and a large total is quickly gained. Ten frames for each player constitutes a game. The maximum score possible is 300, which would be gained by making a strike in each frame. For a description of the bowling games derived from tenpins the reader is referred to the various manuals on the sport. The principal games are cocked hat, cocked hat and feather, college game, Newport game, head-pin game, Glen Island, seven-up, ninepins head-pin out, T game, pin pool, nine up and nine down, head pin, four back, five back, white elephant, open game, seven down, and four back. Consult: Vogell, "Bowling," *Spalding's Athletic Library* (New York, 1895), and *American League Bowling Guide* (New York).

BOWMAN, bō'man, ALEXANDER HAMILTON (1803-65). An American soldier. He was born in Wilkesbarre, Pa., and in 1825 graduated at West Point, where he taught for one year as assistant professor of geography, history, and ethics. He then became assistant engineer in

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the construction of defensive works and of harbor improvements on the Gulf of Mexico. From 1834 to 1839 he was engaged in constructing the Memphis and Saint Francis military road and in improving the navigation of the Cumberland and Tennessee rivers. He was instructor of practical military engineering at West Point (1851-52), and in 1853 was appointed chief engineer of the construction bureau of the United States Treasury Department. During the Civil War he was superintendent of the United States Military Academy, with the local rank of colonel.

BOWMAN, Edward Morris (1848—). An American organist, pianist, choral conductor, and teacher; born in Barnard, Vt. He studied under Dr. William Mason and John P. Morgan, of New York; Weitzmann, Rohde, August Haupt, and Franz Bendel, of Berlin; Batiste and Guilmant, of Paris, and Drs. MacFarren, Bridge, and E. H. Turpin, of London. In 1877 he published the *Bowman-Weitzmann Manual of Musical Theory*, a compilation from his student notes of Weitzmann's theory of harmony. This valuable textbook, indorsed by Weitzmann, was subsequently translated into German. In 1881, while in London, he passed the examination of the Royal College of Organists, and became the first American associate. Beginning in 1884, he served eight terms as president of the American College of Musicians, of which he was the projector and one of the founders, and of which he afterwards became honorary president and trustee. In 1895 he became organist and conductor of the Temple Choir, in connection with the Baptist Temple, in Brooklyn, N. Y., which, while popularizing, has contributed greatly to raise the standard of music, both ecclesiastical and secular, in that metropolitan borough. Mr. Bowman's compositions include songs, part-songs, anthems, and orchestral numbers. One of the leading concert organists and pianists in the United States, he is also one of its most successful theorists, lecturers, and teachers. In 1891 he succeeded Dr. F. L. Ritter as professor of music in Vassar College, and in 1892 was also appointed examiner to Evelyn College, Princeton, N. J. His published lectures include: *Harmony: Historic Points and Modern Methods; Formation of Piano Touch;* and *Relation of Musicians to the Public.*

BOWMAN, Thomas (1817—). An American clergyman, born in Columbia County, Pa. He graduated at Dickinson College in 1837, studied law at Carlisle for a year, and in 1839 became a minister in the Methodist Episcopal Church. He taught in the Grammar School of Dickinson College from 1840 to 1843, and from 1848 to 1858 was president of the Dickinson Seminary at Williamsport, Pa., which he himself had founded. In 1858 he was chosen president of Asbury University (now De Pauw) at Greencastle, Ind. He was a delegate to the Bristol Conference in 1864, and chaplain to the United States Senate in 1864 and 1865. In May, 1872, he was made a bishop, and in 1878 he made an official visit to the Methodist missions throughout the world.

BOWMAN, Sir William (1816-92). An English ophthalmic surgeon; born at Nantwich. He studied at the General Hospital, Birmingham, at King's College, London, and on the Continent, and became a member of the Royal College of Surgeons in 1839. In 1840 he was appointed junior demonstrator of anatomy at King's College; in the same year assistant surgeon, and in 1856 full surgeon, in King's College Hospital; in 1846 assistant surgeon, and in 1851 full surgeon, in the Royal Ophthalmic Hospital, Moorfields. He was in 1848 elected to the chair of physiology and of general and morbid anatomy at King's College; in 1841 became a Fellow of the Royal Society, and in 1844 of the Royal College of Surgeons. In 1880-83 he was the first president of the Ophthalmological Society of the United Kingdom. His *Lectures on the Eye* (1849) established his reputation as a surgeon. His services to general anatomy also were great. The results of many of his investigations in this field are to be found in various papers read before the Royal Society, and in the important *Anatomy and Physiology of Man*, with Todd (1843-56). His *Collected Papers* were published in two volumes in 1892, edited by J. B. Sanderson and J. W. Hulke, with a memoir by H. Power.

BOWMAN'S ROOT. See Gillenia.

BOWMANVILLE, bō'man-vĭl. A town in West Durham County, Ontario, Canada, on Lake Ontario and the Grand Trunk Railroad, 43 miles northeast of Toronto (Map: Ontario, E 4). It has manufactures of agricultural machinery, furniture, and musical instruments, and flour-mills, driven by water-power, and carries on a trade by the lake. It is a port of entry, with a harbor at Port Darlington, 4½ miles from the town. Population, in 1891, 3377; in 1901, 2731.

BOWNDE, bound, or **BOUND**, Nicholas (?—1613). An English clergyman. A son of Richard Bownde, physician to the Duke of Norfolk. He was educated at Cambridge and Oxford, and in 1594 was invested with the title of D.D. at the former university. He became famous through his treatise on the Sabbath (1st ed. 1595), in which he contended that all manner of feasting, as well as May games, shooting, bowling, dances, and all other sports, were a profanation of the seventh day, which he held had been ordained as one of rest, similarly to the Jewish Sabbath. The so-called Sabbatarian Question, which thereby arose, constituted the first point of doctrinal difference between the High-Church party and the Puritans, and expressed the principal point of distinction between the two parties.

BOWNE, boun, Borden Parker (1847—). An American philosopher and educator, born at Leonardville, N. J. He graduated at New York University in 1871, studied at Halle and Göttingen, and in 1876 was appointed professor of philosophy at Boston University. His publications include, *The Philosophy of Herbert Spencer* (1874); *Introduction to Psychological Theory* (1886); *Principles of Ethics* (1892); *The Christian Revelation* (1898); *The Christian Life* (1899); and *The Atonement* (1900).

BOWRING, bou'rĭng, Sir John (1792-1872). An English politician, linguist, and author. He was born at Exeter, October 17, 1792. He early devoted himself to the study of languages, in the acquisition of which he displayed an unusual degree of talent. The national poetry of different peoples had great attraction for him, and he rendered valuable service to literature by collecting and translating both the more ancient and the more modern popular poems of almost all the countries of Europe. He was very intimately as-

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sociated with Jeremy Bentham, who appointed him one of his executors, and intrusted him with the editing of his collected works. He became the first editor of the *Westminster Review*, established in 1824. In 1828 he visited Holland, and his letters—which appeared in the *Morning Herald*, and were afterwards translated into Dutch—procured for him the degree of doctor of laws from the University of Groningen. Subsequent travels were undertaken, on a commission from the British Government, to inquire into the commercial relations of certain States. He visited Switzerland, Italy, Egypt, Syria, and finally the States of the German Zollverein, and everywhere found materials for valuable reports. He was a member of the House of Commons from 1835 to 1837, and again from 1841 to 1849, and actively promoted the adoption of free trade. In 1849, Bowring was appointed British Consul at Hong Kong, and superintendent of trade in China. He returned in 1853, and in the following year was made knight, and subsequently Governor of Hong Kong. In 1856 an insult having been offered to a Chinese vessel, said to have been under the protection of the British flag, Bowring, without consulting the home Government, ordered an attack on certain Chinese forts—a proceeding which excited considerable dissatisfaction in the country and produced a ministerial crisis. In 1855 he concluded a commercial treaty with Siam, and gave an interesting account of his visit in *The Kingdom and People of Siam*. In 1858 he visited Manila, and afterwards published an account of the Philippine Islands. In 1861 Bowring was sent on an official mission to Italy. He died November 23, 1872. Consult his *Autobiographical Reminiscences* (London, 1877).

BOWS, bōz. The name of an old fiddler in the novel *Pendennis*, by Thackeray. Though himself in love with the inane Emily Costigan, he is inspired by no selfish motive when he helps free Arthur from her father's designs upon him.

BOWSER, bou'zēr, EDWARD ALBERT (1845—). An American mathematician, born at Sackville, New Brunswick. He graduated at Rutgers College in 1868, was appointed professor of mathematics there in 1870, and director of the United States Geodetic Survey of New Jersey in 1875. His publications include: *Analytic Geometry* (1880); *Differential and Integral Calculus* (1880); *Analytic Mechanics* (1884); *Hydromechanics* (1885); *College Algebra* (1888); *Plane and Solid Geometry* (1890); *Treatise on Trigonometry* (1892); and *Logarithmic Tables* (1895).

BOWSPRIT, bō'sprĭt' (*bow* + *sprit*, OE. *spret*, a spear). A large boom, spar, or mast projecting over the stem or head of a ship. Its use is to carry sail forward, as a means of counteracting the effect of the after sails, and keeping the ship well balanced. It is also one of the chief supports of the foremast, which is fastened to it by large stays or ropes. In ordinary ships, the bowsprit rises at an angle of about 30° from the horizon. It is secured in place by heavy framing at the *heel* or inboard end—just inside the bow by iron straps or lashings of wire rope called the *gammoning*, which hold it down to the stem, and outside the ship by the *bobstays*, which extend from the bowsprit to cutwater.

BOWSTRING (bō'string') **HEMP.** See HEMP, BOWSTRING.

BOWZYBEUS, bou'zĭ-bē'ŭs. One of the best characters in *The Shepherd's Week*, a series of parodies on the artificial pastoral poetry of his time, by John Gay (1714).

BOX, *Buxus* (Lat. *buxus*, from Gk. πύξος, *pyxos*). A genus of plants of the natural order Euphorbiaceæ; evergreen shrubs or small trees, with opposite leaves, entire at the margins, and with greenish, inconspicuous flowers in little axillary clusters, the male and female flowers distinct, but on the same plant. The most important species is the common box (*Buxus sempervirens*), which grows wild in the south of Europe, and in some parts of Asia, attaining a height of twenty or more feet; its leaves are oval, generally from half to three-quarters of an inch in length, smooth and shining, of a deep green color, and a compact habit of growth. There are several cultivated varieties distinguished by differently variegated leaves—gold-edged, silver-edged, etc. Dwarf box grows only to a height of two or three feet, and is very commonly used to form borders for garden-plots, being kept down by clipping to a height of a few inches. The box bears clipping remarkably well, and it was much used in formal gardens for this purpose. The wood of the box is heavy, of a beautiful, pale-yellow color, remarkably hard and strong, of a fine, regular, and compact texture, capable of a beautiful polish, and not liable to be worm-eaten. It is much valued for the purpose of the turner and the wood-carver; is preferred to every other kind of wood for the manufacture of flutes, flageolets, and other wind-instruments, as well as of mathematical instruments, and is unrivaled for wood-engraving. (See ENGRAVING.) Spain and Portugal send into the market large quantities of boxwood; also Circassia and Georgia. The Minorca box, or Balearic box (*Buxus balearica*), a native of Minorca, Sardinia, Corsica, Turkey, etc., is a larger tree than the common box. The wood is of a bright yellow, and inferior to the true boxwood, but is exported in large quantities from Constantinople. The earliest known fossil forms of Buxus have been found in the Pliocene deposits of France. For illustration, see BEECH.

BOX AND COX. A short farce by John M. Morton. A landlady, Mrs. Bouncer, unknown to both, lets her single room to two men of these names, one of whom works in the daytime, the other at night. All goes well, and Mrs. Bouncer gets double rent till the day worker has a holiday and the night worker finds a stranger in possession of his room; upon which there is an amusing explanation, which ends in their swearing eternal friendship, and in Mrs. Bouncer's continuing to get double rent.

BOXBERRY. See GAULTHERIA.

BOX-ELDER (*box*, the tree + *elder* or *alder*), or ASH-LEAVED MAPLE (*Acer negundo*, or *Negundo aceroides*). One of the hardiest and most widely distributed trees in the United States, ranging as it does from Vermont to Florida, and westward to the Rocky Mountains. In rich river-bottoms it often attains a height of more than sixty feet and a diameter of three feet. The wood is light and soft, and is suitable for woodenware, wood-pulp, etc. The box-elder is considered a good shade-tree, and it has been extensively employed in plantings in the Western

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States for windbreaks, shade, fuel, etc. It is of rapid growth, and serves as an excellent nurse-tree for other species. In some parts of the Northwestern States sugar is made from the sap, although that is not so abundant as in the sugar-maple.

BOXFISH. See TRUNKFISH.

BOXHAULING. A method of changing a ship from one tack to the other. It is resorted to when a ship fails to go around (i.e. *misses stays*) while attempting to tack (q.v.) in narrow waters, or on a lee shore, and there is no room to *wear* (q.v.), and in narrow channels when there is danger of running on shore in tacking. The first part of the manœuvre resembles tacking; the helm (q.v.) is put down and the ship brought up head to wind with all the sails aback. Her headway is thus quickly checked, the head-yards (those on the foremast) are then swung around (i.e. braced *abox*, from which circumstance the manœuvre takes its name), as if on the other tack, and the after yards (those on the mainmast and mizzenmast) *squared* (i.e. placed athwartship). She now gathers *sternboard* (i.e. starts to sail astern), and continues to back around, turning her stern up into the wind, which operation is facilitated by bracing the after yards like the fore as soon as the wind is abeam. After the wind has passed the stern, the ship gradually gathers headway and comes up to the wind on the new tack, when the operation is completed.

BOXING (probably akin to Dan. *bask*, slap, blow, *baske*, to slap, strike). Since the days when fighting with the bare fists was made unlawful, the tendency of the interpretation of the word 'boxing' has been to limit its use to exhibitions of skill, and to use the word pugilism when referring to professional contests under the old rules and to ancient gladiators. Modern boxing-rules, known as the 'Queensberry Rules,' which govern even professional prize-fights, have eliminated the worst features of the pugilism of antiquity, and effected a great improvement in modern methods. The ancient method was to make the punishment as cruel as possible by wearing a *cestus* of bronze, several thicknesses of rawhide strongly fastened together and projecting beyond the knuckles, and by binding the wrist and forearm with leather thongs, by these means adding to the capacity of the bare hand to inflict injury. The present custom of wearing a padded glove lessens this capacity. The last remnant of barbarism disappeared from pugilism when wrestling, which played an important part in the contests of the Eighteenth and first half of the Nineteenth centuries, was ruled out. How late it lasted is testified by the reports of the historic battles of Mendoza, Bendigo, and Sayers, in which such passages as the following were common: "After a short struggle both men went down, the Tipton Slasher uppermost;" or, "They then closed, and after a short tussle, the Infant threw his man, falling heavily upon him."

How ancient was the practice of pugilism may be gathered from many writings of antiquity. In the roll-call at the seige of Troy, Pollux is described as "good with his fists." There are many interesting details of it at the funeral of Patroclus, including the mention of the belt, which is still the emblem of pugilistic championships, and the habit of having such contests as part of a funeral celebration has survived to this day in Siam. Vergil's description of the fight between Dares and the Sicilian Entellus is another classical description of the sport.

Among the English sports of the Middle Ages boxing did not occupy so prominent a place as cudgeling and quarter-staff; and Figg, whose portrait was painted by Hogarth, may be considered as the modern father of the 'noble art of self-defense.' From his time until 1860, when Sayers fought Heenan, the list of champions is unbroken. Up to this period the science of self-defense had made but little progress, and strength and endurance constituted the only recommendations of the practitioners at Smithfield, Moorfield, and Southwark Fair, which had long had booths and rings for the display of boxing. Broughton, who occupied the position of 'champion of England,' built a theatre in Hanway Street, Oxford Street, in 1740, for the display of boxing; advertisements were issued announcing a succession of battles between first-rate pugilists, who never quitted the stage till one or the other was defeated, the reward of each man being dependent upon and proportioned to the receipts. Broughton was for eighteen years champion of England. He propounded some rules for the regulation of the ring which remained in authority till 1838, or nearly a century. They are now spoken of as the 'old rules.' Rule 1 is, that a square of a yard be chalked in the middle of a stage, and that in every fresh set-to after a fall, the seconds are to bring their men to the side of the square, and to place them opposite each other; and until this is done, it is not lawful for one to strike the other. Rule 2, that if either of the combatants be unable to be brought up to the square within thirty seconds after a fall and the close of a round, he shall be deemed a beaten man. No man is permitted to hit his adversary when he is down, or to seize him by the breeches, or below the waist, and a man on his knees is to be reckoned down. These rules laid the foundation of fair play. To Broughton also is due the introduction of gloves for 'sparring-matches,' whereby lessons could be taken without injury. The greatest professor of the art was Jackson, who was champion in 1795. He was not only the most scientific boxer of his day, but he gave his art such a prestige and popularity that half the men of rank and fashion of the period were proud to call themselves his pupils. He opened rooms for the practice of boxing in Bond Street, and for years these were crowded by men of note. His 'principles of pugilism' were, that contempt of danger and confidence in one's self were the first and best qualities of a pugilist; that, in hitting you must judge well your distances, for a blow delivered at all out of range was like a spent shot, and valueless; that men should fight with their legs, using all possible agility, as well as with their hands, and that all stiffness of style or position was wrong. Jackson is still regarded as one of the best theorists on the art. At this period pugilism was actively supported by many persons of high rank. In 1814, when the allied sovereigns visited England, among other entertainments, a sparring display was provided under Jackson's management, and the distinguished foreigners expressed much gratification at the exhibition of so much science and fine physical development. Besides Jackson, Belcher, Gulley,

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and Cribb were noted champions at this period, which may be termed the palmy days of the ring. From various causes, its decline has since been uninterrupted. The more distinguished patrons gradually withdrew; the Pugilistic Club, which had been established in 1814, and included all the aristocratic patrons of the ring, was broken up. Magistrates set their faces against the lawless assemblies of roughs and pickpockets who latterly formed the greater part of the spectators at prize-fights. In 1860, however, the international combat between Tom Sayers, the Englishman, and John Heenan, the American, revived for a moment public interest in the art; but after that prize-fights were suppressed, and glove contests adopted under the Queensberry rules, which govern them all the world over. Under these rules wrestling and hugging are prohibited, each round is limited to three minutes with one minute interval, and the time allowed for a fallen man to get up is reduced to ten seconds. The art thenceforward was vigorously maintained in England by many amateur clubs, among the most important of which was the Amateur Athletic Club, founded in 1866. Tom Sayers retired after the fight with Heenan in 1860, leaving the championship of the world open for competition. Jem Mace, by a series of contests, became entitled to meet J. Allen for it in America in 1870, and defeated him. James Smith became the next champion of England in 1885. He was beaten by Jake Kilrain, of Boston, in 1887, Kilrain becoming the world's heavyweight champion. In 1889 John L. Sullivan, of Boston, defeated Kilrain. James J. Corbett beat Sullivan in 1892, but was defeated in 1897 by Robert Fitzsimmons, who in his turn was vanquished by James J. Jeffries in 1900, and again in 1902. The art of boxing, as an active and healthy exercise, is likely to be maintained; it is a part of all gymnasium work in the United States, so far as facilities for the exercise are concerned, and it has been taken up by the Amateur Athletic Union, which aims to carry it on as a high-class sport, as distinct from professional pugilism. On pugilism, consult: *Fistiana* (London, 1868); *American Fistiana* (New York, 1876); Egan, *Boxiana*, 4 vols. (London, 1818-24); and for the side of boxing as a sport, Doran, *Self-Defense* (Toronto, 1879); Trotter, *Practical Treatise on Boxing* (Philadelphia, 1900); *Boxing*, Badminton Library (London, 1889); *Boxing*, Oval Series (London, 1896); *Boxing*, Spalding's Athletic Library (New York, 1893).

BOXING-DAY. A popular term applied to December 26th, in England. On that day the gentry were accustomed to give presents, generally of money, to their servants or others of humble life. These presents came to be known as *Christmas boxes*. The custom is, perhaps, traceable to that of the Romans during the season of the Saturnalia (q.v.). A fanciful derivation of the term is to be found in Dunton's *Athenian Oracle* (reprinted by Bell, London, 1728, 4 vols.); but its actual origin is very obscure. The practice has of recent years been regarded as a nuisance, and in 1836 was actually legislated against, so far as Government employés were concerned. Boxing-day is one of the four legal bank-holidays, the others being Easter Monday, Whit-Monday, and the first Monday in August. Consult Brand, *Popular Antiquities* (edited by Ellis, London, 1843, 3 vols.).

BOXING THE COMPASS. One among many sea phrases whose origin is not easily traceable. It means simply a rehearsal or enumeration of the several points, half-points, and quarter-points of the mariner's compass, in their proper order, and is among the lessons which a young sailor has to learn. See COMPASS.

BOXTEL. A town and important railway junction in North Brabant, Holland, at the confluence of the Beerze and Dommel, 6 miles south of Bois-le-Duc (Map: Holland, D 3). The Church of Saint Peter and the castle of Stapel are the chief buildings. It has celebrated manufactures of damask linens, of paper and salt. In 1794 the French here won an important victory over the Anglo-Dutch Army. Population, in 1899, 6743.

BOXTHORN, or MATRIMONY VINE. See LYCIUM.

BOX TORTOISE, tôr'tĭs *or* -tŭs, or **TURTLE.** See TURTLE.

BOYACÁ, bō'yä-kä'. A State of the Republic of Colombia, South America, bordering upon Venezuela and the States of Santander and Cundinamarca. It covers an area of 33,351 square miles. In the western part of the State is a branch of the Andes, from which the land slopes east in vast prairies, covered to a great extent with marshes and forests, with here and there pastures and cultivated ground, watered by the Orinoco and the Meta. The lowlands are fertile, yielding tropical fruits, sugar, cotton, cacao, tobacco, dyes, drug-stuffs, and timber. In the mountainous parts of the State various minerals are found, and in the south are situated a number of hot springs. The people have rude manufactures of cotton, wool, straw, etc., but cattle-raising is the chief occupation. Capital, Tunja. Population, in 1890, 645,000. Only a small part of the State is inhabited.

BOYACÁ. A town of Colombia, about 60 miles northeast of Bogotá, near which in 1819 Bolívar won a victory over the Spaniards, and thereby secured the independence of Colombia (Map: Colombia, C 2). Population, 7000.

BOY AND THE MANTLE, THE. A ballad, among those collected by Bishop Percy, which relates that a youth once came to King Arthur's Court, bearing a cloak which, he said, only such wives could wear as had always been faithful. It fell to the possession of Sir Craddock, whose wife alone was pure, together with a golden cup "which no cuckold could drink from," and a brawn's head, which no cuckold could cut.

BOYAR, bō-yär', or BOJAR (Russ. *boyarinŭ*, originally either (1) fighting man, warrior, from *boy*, fight, battle, or (2) 'great man,' for *bolyarinŭ*, from Slav. *bolĭ*, Russ. *bolshoy*, great, grand. The modern Russian form is *barinŭ*, estate holder, nobleman, master). A word originally of the same meaning as Czech, Lech, and Bolgarin—i.e. free proprietor of the soil. The Boyars in Old Russia were the order next to the kniazes or knieses (ruling princes). They formed the immediate 'following' of these princes, and bore somewhat the same relation to them as the lesser English and Scottish knights of the feudal ages bore to the great barons. They had their own partisans, who served as a kind of bodyguard. They gave their services to a prince of their own choice, whom, however, they left again at their pleasure; and, in consequence of this, the kniazes

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could secure their allegiance only by the bestowal of privileges. They held exclusively the highest military and civil offices, and the most powerful rulers considered it prudent to use this form of expression in their ukases: "The Emperor has ordered it; the Boyars have approved it." Rank among the Boyars was always proportioned to length of State service, and was rigidly observed. This gradation of rank was called *myestintchestvo* (from *myesto*, place at the table during Court functions, rank). The institution was peculiar to Slavic life, equally unlike feudalism and modern aristocracy, and must be regarded as a strictly national development. In their housekeeping the Boyars were excessively fond of splendor, and their contempt for the serfs, or 'lower orders,' was immeasurable. In the lapse of time many Chinese customs—as might be expected from their theory of rank—crept into their public life. Their power, and the respect which was paid them, acted as a wholesome check upon the otherwise unbridled authority of the princes; in consequence of which the latter became their bitter enemies, and often sought to destroy their power. This was finally done by Peter the Great, who abolished the order of Boyars, giving them a place among the Russian nobility, but stripping them of their peculiar privileges. The last Boyar, Kniaz Ivan Yuryevitch Trubetskoy, died January 16, 1750. In Rumania Boyars still exist. Consult: Rambaud, *History of Russia*, English translation by Well (London, 1887); Wallace, *Russia* (London, 1877).

BOY BISHOP. The custom of electing a boy bishop on Saint Nicholas's Day dates from a very early period. In England it seems to have prevailed in many parishes. The election took place on Saint Nicholas's Day (December 6), and the authority lasted until Holy Innocents' Day (December 28). The boy bishop was usually chosen from the children of the church or cathedral choir, but the custom also prevailed in the schools of Winchester and Eton. He was arrayed in episcopal vestments, and, attended by a crowd of subordinates in priestly dress, went about with songs and dances from house to house, blessing the people. The boy bishop was supposed to exact implicit obedience from his fellows, who with their superior took possession of the church, and performed all the ceremonies and offices except mass. The custom found countenance not among the populace only. In 1299 it is said that Edward I., on his way to Scotland, permitted a boy bishop to say vespers before him at Heton, near Newcastle-on-Tyne, and gave him and his companions a present. At Salisbury, and perhaps in other places also, the boy bishop—so it is said—had the power of disposing of such prebends as happened to fall vacant during the days of his episcopacy; and if he died during his office, the funeral honors of a bishop, with a monument, were granted him. In England the custom of electing a boy bishop was abolished in the reign of Elizabeth, though it seems to have lingered here and there in villages till about the close of her reign. Consult Walcott, *Sacred Archæology* (London, 1868).

BOYCOTTING. A species of conspiracy (q.v.), named after one of its conspicuous victims, Captain Boycott, an Englishman, who was agent of Lord Earne in the District of Connemara, Ireland. As agent he served notices to quit on the tenants, who retaliated by inducing the population for miles around to refuse to have anything to do with him. His servants left. Armed constables were called in to protect him and those who came to take the places of former tenants and servants from violence at the hands of the surrounding population. The term, therefore, originally signified a conspiracy to ruin the business of a person by the violent interruption of his relations with others. It has been defined by an eminent American judge as "a combination of many to cause a loss to one person by coercing others against their will to withdraw from him their beneficial business intercourse, through threats that unless those others do so, the many will cause similar loss to them." A boycott, even when unaccompanied by violence or intimidation, has been pronounced unlawful by many courts; when accompanied by violence, it is undoubtedly a criminal offense at common law. See the authorities referred to under CONSPIRACY; TORT.

BOYD, ANDREW KENNEDY HUTCHISON (1825-99). A Scottish divine and author, born at Auchinleck, in Ayrshire. He studied at King's College and at the Middle Temple in London, evidently with a view to the law, but he took his bachelor's degree at Glasgow (1846). Licensed to preach by the Presbytery of Ayr in 1850, he became assistant in Saint George's Church, Edinburgh, and in 1851 minister of Newton-on-Ayr, as successor of John Caird. From 1854 to 1859 he was minister of Kirkpatrick-Irongray, near Dumfries. While there he gained a wide reputation for his *Recreations of a Country Parson*, contributed under the initials A. K. H. B. to *Fraser's Magazine*. In 1859 he was appointed to Saint Bernard's, Edinburgh, and in 1865 he became minister of the first charge at Saint Andrews. For the part he played in literature and in the Church councils, he was soon the best known among the Scottish divines of his day. In 1889 he received the degree of LL.D. from Saint Andrews, and in 1890 he was appointed Moderator of the General Assembly. He died at Bournemouth, and was buried at Saint Andrews. *The Recreations of a Country Parson* (1859, 1861, 1878) appeared in three series. He published an extremely interesting series of autobiographical sketches bearing the titles: *Twenty-five Years of Saint Andrews* (1892); *Saint Andrews and Elsewhere* (1894); *Occasional and Immemorial Days* (1895); and *Last Years of Saint Andrews* (1896). Among his other publications are: *Graver Thoughts of a Country Parson* (1862); *Leisure Hours in Town* (1862); *The Commonplace Philosopher in Town and Country* (1862); *Autumn Holidays of a Country Parson* (1864); *Critical Essays of a Country Parson* (1865); *Present-day Thoughts* (1871); *Our Little Life*, two series (1882-84); *Our Homely Comedy and Tragedy* (1887); *The Best Last* (1888); and *To Meet the Day*, and *East Coast Days and Memories* (1889).

BOYD, BELLE. The pen-name adopted by Mrs. Belle Boyd Hardinge.

BOYD, JOHN PARKER (1764-1830). An American soldier, born at Newburyport, Mass. He entered the United States Army in 1786; went in 1789 to India, and there organized a

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small mercenary force, retained in the service of various native princes. Having returned to the United States in 1808, he was in the same year appointed colonel of the Fourth Infantry, and in 1811 distinguished himself at the battle of Tippecanoe. During the War of 1812, with the rank of brigadier-general, he was notably prominent at the capture of Fort George, Canada, and at Chrysler's Field. He published a pamphlet, *Documents and Facts Relative to Military Events During the Late War* (1816), containing the text of a memorial communicated to the War Department in protest against his non-retention as an officer in the peace establishment.

BOYD, ZACHARY (1585-1653). A Scottish divine. He was born at Penkill, Ayrshire, Scotland, about 1585; was educated at Kilmarnock, and studied at the universities of Glasgow and Saint Andrews and the Protestant College of Saumur in France, of which latter he was in 1611 appointed a regent or professor, and is said to have declined the principalship. The persecutions of the Protestants in France caused him to return to Scotland in 1623, and he became minister of the Barony Parish, Glasgow, and was thrice elected rector of the university of that city. His principal prose work, *The Last Battell of the Soule in Death*, was published at Edinburgh in 1629, in two volumes. He was author of eighteen other works, chiefly of a religious cast. His Bible songs and his *Psalmes of David in Meeter* appeared at Glasgow in 1648. He died in 1653, leaving numerous MSS. and his library, with a considerable legacy, to the University of Glasgow, and his bust is now preserved in its library. Among his MSS. is a collection of quaint poems on Scriptural subjects, entitled *Zion's Flowers*, usually called Zachary Boyd's Bible. Gabriel Neil reprinted at Glasgow, in 1831, Boyd's *Last Battell*, and published a life of Boyd, in 1855, with four poems from *Zion's Flowers*. *Four Letters of Comforts for the Deaths of the Earle of Hadingtoun and of the Lord Boyd*, originally 1640, were reprinted in fac-simile at Edinburgh, 1878.

BOY'DELL, JOHN (1719-1804). An English engraver and publisher of prints. He was born at Darrington, Shropshire, January 19, 1719, studied engraving in London for several years, and was a designer and painter in water-colors, but won celebrity chiefly as a patron of art. The works of British engravers, through his influence, rose to such a high degree of excellence that they were sought after by all Europe, and the importation of foreign prints at that time in a great measure ceased. He then directed his attention to the art of painting, undertaking to illustrate Shakespeare from the works of English artists. In bringing this project to completion he expended several thousand pounds, and no less than 170 pictures were required for this great work. His Shakespeare Gallery was ready for the public in 1789, but in 1805, owing to pecuniary embarrassment, the prints were sold by lottery; but Boydell died before the lottery was held. In 1774 he was elected alderman, and in 1790 held the office of lord mayor. At a Royal Academy dinner in 1789 Sir Joshua Reynolds toasted him as the 'commercial Mæcenas of England.'

BOY'DEN, SETH (1785-1870). An American inventor, born in Massachusetts. He invented a machine for splitting leather and a process for making spelter. In 1826 he made the first malleable cast iron. Among his other inventions was one for making hat-bodies, and a process for making Russia sheet iron. He built the first successful locomotive that had the cylinders outside of the frame.

BOYD'S. The courtyard in front of the White Horse Inn, where Dr. Johnson alighted on his first arrival in Edinburgh, as narrated by Boswell. It has since been swept away to make room for modern houses and streets.

BOYE, bō'ye, CASPAR JOHANNES (1791-1853). A Danish preacher and poet, born at Kongsberg, Norway. He studied theology in Copenhagen, was pastor of various parishes, and from 1847 in Copenhagen. He was known as a translator of Walter Scott, but established his reputation chiefly by his dramas, the best of which are the three tragedies: *Juta* (1823); *Svend Grathe* (1824); and *Erik den Syvende* (1827). His collected poetic works appeared at Copenhagen in 1850-51.

BOYEN, bō'yen, HERMANN VON (1771-1848). A Prussian field-marshal. He was born at Kreuzburg, East Prussia, and was descended from an ancient noble family of Bohemia. In 1809 he entered the War Department of the Prussian Government, where he counseled the abolition of the militia system and the introduction of general military duty. As director of the War Department he acted as the confidential adviser of the King from 1810 to 1812. He was afterwards appointed Prussian Minister of War, in which capacity he introduced the law of compulsory military service (September 3, 1814). Upon his retirement in 1847 he was raised to the rank of field-marshal. His services in behalf of Prussia were recognized in an address by Emperor William I. to the senior members of the Order of the Iron Cross, March 31, 1871. The Emperor said: "Recognizing that we have only built upon the foundations laid in 1813, 1814, 1815, we should fitly appreciate the splendid services of the men of that epoch, and notably those of Boyen."

BOYER, bwä'yā', ALEXIS, Baron de (1757-1833). A French surgeon. He was a barber-surgeon's apprentice, then studied medicine, and soon won recognition. In 1787 he was appointed second surgeon to the Hôpital de la Charité at Paris, and afterwards was professor, first of operative surgery, and then of clinical surgery, at the Ecole de Santé. In 1804 he was appointed first surgeon to Napoleon. After the Restoration Boyer became professor of practical surgery in the University of Paris, and first surgeon at the Hôpital de la Charité. In 1823 he was appointed consulting surgeon to the King, and in 1825 was admitted a member of the Institute. His best-known works are his *Traité complet d'anatomie*, 4 vols. (1797-99) and his *Traité des maladies chirurgicales et des opérations qui leur conviennent*, 8 vols. (1814-22).

BOYER, JEAN BAPTISTE DE. See ARGENS, Marquis d'.

BOYER, JEAN PIERRE (1776-1850). A general and President of the Republic of Haiti. He was a mulatto. He was born at Port-au-Prince,

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received a European education, and in 1792 entered the military service. After his return to Haiti he joined the blacks, who had risen against the French. After the commissioners of the French Convention had proclaimed the freedom of the blacks in Haiti (1793) he fought with the mulattoes against the negroes and with the negroes against the English. He was compelled to flee to France, but returned with General Leclerc in 1802. After the French had been expelled, and negro domination established, Boyer united with Pétion and Christophe to overthrow Dessalines, the negro despot; but when Christophe made himself Emperor, Pétion established an independent republic in the southwestern part of the island, and Boyer became Governor of Port-au-Prince, and the firmest adherent of the new commonwealth, which he defended against the troops of Christophe. Upon the death of Pétion, in 1818, Boyer was unanimously elected President. Within three years he brought the entire island under his rule, and in 1825 obtained from France the recognition of the Haitian Republic. At first the country improved under his administration, but power corrupted him. His cruel and arbitrary conduct aroused great discontent, and the imposition of oppressive taxes necessitated by the payment of an indemnity of 150,000,000 francs to France stirred up an insurrection in 1843. Boyer fled to Jamaica, and, after the Revolution of 1848, retired to France, where he died.

BOY'ESEN, HJALMAR HJORTH (1848-95). A Norwegian-American novelist and littérateur. He was born at Frederiksvärn, Norway, September 23, 1848, and studied in Christiania and in Leipzig. In 1869 he came to America, edited the *Fremad*, a Scandinavian journal, in Chicago, became professor of German at Cornell (1874-80), and held a professorship in Columbia University, New York, from 1880 till his death. He acquired a facility in English remarkable in a foreigner, and within six years of his emigration had achieved popularity in English prose and verse. His more noteworthy works of fiction are *Gunnar: A Norse Romance* (1874); *Tales from Two Hemispheres* (1876); *Falconberg* (1878); *Ilka on the Hilltop* (short stories, 1881); *Queen Titania* (1881); *A Daughter of the Philistines* (1883); *Social Strugglers* (1884); and *The Golden Calf* (1892). His critical essays are contained in *Goethe and Schiller: Their Lives and Works* (1878); *Literary and Social Silhouettes; Essays on Scandinavian Literature;* and *Essays on German Literature.* His poems are gathered in *Idyls of Norway* (1882). He also wrote negligible juveniles. *Ilka on the Hilltop* was dramatized in 1884, and a play of his called *Alpine Roses* was produced in the same year. He died in New York, October 5, 1895.

BOYET, *Fr. pron.* bwä'yâ'. The name of a lively Frenchman in Shakespeare's *Love's Labour's Lost*, always 'stabbed with laughter,' when not himself stabbing others with it.

BOYL, ANTONIO. See BOIL, BERNARDO.

BOYLE. A town in Roscommon County, Ireland, picturesquely situated in a valley on both sides of the Boyle, 1 mile above Lough Key, and 8 miles northwest of Carrick-on-Shannon. It is noted for its well-preserved Twelfth-Century Cistercian abbey, of considerable architectural interest; has military barracks, and is a favorite angling centre. It has a large grain and butter trade. Latin and English annals of Boyle, dating from 420 to 1245, have been published. Population, 2500.

BOYLE, CHARLES, fourth Earl of Orrery (1676-1731). An English soldier and physicist. He was born at Chelsea, was educated at Christ Church, Oxford; succeeded to his title in 1703; fought at Malplaquet, was made major-general, and received several Court appointments. He died August 28, 1731. After him was named the astronomical instrument known as the 'Orrery.' Boyle is chiefly remembered for the part he took, while a student, in the controversy over the antiquity of the *Epistles of Phalaris.* He was silenced by Bentley (q.v.). The literary quarrel led to Swift's *Battle of the Books.* Of his poems, even Sir Richard Blackmore said:

> "After his foolish rhymes, both friends and foes
> Conclude they know *who did not write his prose.*"

See BATTLE OF THE BOOKS.

BOYLE, JOHN, Earl of Orrery and Cork (1707-62). An Irish writer. He is best known for his strangely unappreciative and malicious *Remarks* (1751) on his dead friend Swift, and for his excellent rendering into English (1751) of the *Epistolæ* of Pliny the Younger.

BOYLE, RICHARD (1566-1643). The founder of the house of Cork and Orrery, and styled the 'great Earl of Cork,' was born at Canterbury, England. At the age of 22 he went over to Ireland, where he afterwards bought estates and improved them, promoted the immigration of English Protestants, and triumphed over his accusers and enemies through the intervention of Queen Elizabeth. In 1620 he became Viscount Dungarvan and Earl of Cork. In 1631 he was made Lord High Treasurer—an office which remained hereditary in his family. In his old age he suppressed a rising of Munster rebels.

BOYLE, ROBERT (1627-91). An English physicist and chemist. He was the son of the first Earl of Cork, and was born at Lismore Castle, Waterford, Ireland, January 25, 1627. As a child, he was distinguished by precocity of intellect and a rare love of truth. After studying at Eton and at home, he went to the Continent, where he stayed for six years (1638-44). On his return he found himself in possession, by his father's death, of the Manor of Stalbridge, Dorsetshire, where he resided till 1650. He took no part in political strife, but devoted himself to the cultivation of science, and particularly of chemistry and natural philosophy. He was one of the first members of that association of scientific men which about that time (1645) held private meetings at Oxford and London, and some years after became better known as the Royal Society. In 1654 he settled at Oxford. Here he experimented extensively in pneumatics, and improved the air-pump. At the same time he devoted considerable study to theology. After the Restoration he was urgently advised by Lord Clarendon to take orders, but he thought that he could do better service to religion as a layman. Among the proofs which he gave of this, besides his own theological writings and eminent example, were his exertions as Governor of the Corporation for the Spread of the Gospel in New England, as well as in procuring and circulating at his own expense translations of the Scriptures, and his bequest for the foundation

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with £50 of the "Boyle Lectures" (q.v.) in defense of Christianity. In 1668 he took up his residence permanently in London, and was thenceforth able to devote much of his time to the business of the Royal Society. In 1680 he was chosen president, but declined the honor. A peerage had repeatedly been offered to him, and declined. In 1688, finding his health failing, he shut himself up against all interruption, in order to husband his remaining time for the labor of repairing the loss caused by the accidental destruction of his MSS. In 1689 his failing health induced him to lessen his activities in various directions, and on December 30, 1691, he died in London. Boyle was tall and emaciated in person, and extremely temperate in his habits, often subject to low spirits, but naturally lively and of rare conversational powers. His scientific reputation was unrivaled among his contemporaries, who regarded him as the successor to Bacon's primacy in such matters. His work in science is fully discussed in this Encyclopædia under the title CHEMISTRY. See also BOYLE'S LAW. Boyle's style in writing was very verbose. His complete works (including his very interesting correspondence), with a life by T. Birch, and an index, were published in 5 vols. (London, 1744; 2d ed. 1772, 6 vols.).

BOYLE, ROGER (1621-79). An English soldier, statesman, and author. He studied at Trinity College, Dublin, and was at first a partisan of Charles I., but subsequently served under Cromwell, of whose Privy Council he became a member. After Cromwell's death he secured Ireland for Charles II., and upon the Restoration was made Earl of Orrery. He wrote *Parthenissa* (1665-67), and *A Treatise of the Art of War* (1677), besides plays and poems.

BOYLE LECTURES. An annual course of lectures delivered at Saint-Mary-le-Bow Church, London, so called from the founder, the Hon. Robert Boyle (q.v.), who settled an annual salary of £50 charged upon his dwelling-house in Saint Michael's, Crooked Lane, London, for 'some preaching minister,' who shall preach eight sermons in the year for proving the Christian religion against atheists, deists, pagans, Jews, and Mohammedans, not descending to any controversies among Christians themselves. Archbishop Tennison procured a yearly salary of £50 to be charged upon a farm at Brill, Bucks, instead of the original charge for the endowment. The office is tenable for three years.

The first series of lectures, *A Confutation of Atheism*, was preached in 1692 by Richard Bentley (q.v.). In 1704 Dr. Samuel Clarke preached the lectures, entitled *A Demonstration of the Being and Attributes of God*, in answer to the arguments of Hobbes, Spinoza, and their followers. All the lectures preached up to 1732 were collected into a fine folio edition, in 3 vols. (London, 1739); since that period, till recently, few of the lectures have been published, but among them may be mentioned F. D. Maurice, *The Religions of the World* (1846, 4th ed. 1862); C. Merivale, *The Conversion of the Roman Empire* (1864); *The Conversion of the Northern Nations* (1865); E. H. Plumptre, *Christ and Christendom* (1866); J. A. Hessey, *Moral Difficulties Connected with the Bible* (3 series, 1871-73); H. Wace, *Christianity and Morality* (1874, 5th ed. 1882); W. C. E. Newbolt, *The Gospel of Experience: or, the Witness of Human Life to the Truth of Revelation* (1895).

BOYLE'S FUMING LIQUOR, or VOLATILE LIVER OF SULPHUR. A mixture of various ammonium polysulphides. It is obtained in the form of a dark yellow, strongly fuming liquid with a pungent odor of hydrogen sulphide, by distilling a mixture of 1 part of sulphur, 2 parts of ammonium chloride, and 3 parts of lime.

BOYLE'S LAW. A law of physics formulated by Robert Boyle, which states that when a gas is at a constant temperature, the product of the pressure and volume of a given mass remains constant. The same discovery was also made by the French physicist Mariotte, and the law is sometimes called Mariotte's Law, or the Law of Boyle and Mariotte. See ELASTICITY; HEAT; and CRITICAL POINT.

BOYLSTON, boil'ston, ZABDIEL (1680-1766). An American physician, born in Massachusetts. He was the earliest advocate of inoculation in the United States, but the whole profession opposed him, and a law, afterwards repealed, was passed against the practice. He secured the support of several prominent ministers, however, and the practice gradually became general in New England. He wrote several pamphlets on inoculation and several papers in the *Philosophical Transactions of London*. Consult an article, "Zabdiel and John Boylston," in Vol. XXXV. of the *New England Historical and Genealogical Register* (1881).

BOYNE, boin (Ir. *Boinn*). The most important river in the east of Ireland, rising in the Bog of Allen, and flowing through Kildare, King's County, Meath, and Louth (Map: Ireland, E 3). It passes Trim, Navan, Slane, and Drogheda, and enters the Irish Sea 4 miles below the last town, after a course of over 70 miles, its total descent being 336 feet. Its chief tributaries are the Deel, Mattoch, and Blackwater. It is navigable for vessels of 250 tons to Drogheda, and for barges of 70 tons to Navan, 19 miles up. Turgesius, the Dane, sailed up the Boyne in the year 838 and plundered Meath. It is chiefly famous for the battle of the Boyne (q.v.), which took place on its banks near Drogheda, in July, 1690. Consult Wilde, *The Beauties of the Boyne and the Blackwater* (Dublin, 1869).

BOYNE, BATTLE OF THE. A battle fought on July 11 (new calendar; July 1, old style), 1690, 3 miles west of Drogheda, on the banks of the Boyne, Ireland. This battle was fatal to the cause of James II., and assured the ascendency of Protestantism in England. The troops of James, 30,000 in number, were defeated with a loss of 1500 by the forces of William III. (James's son-in-law), who had about the same number of men, but lost only about 500. An obelisk, 150 feet high, marks the scene of the battle. For the bitter feeling among the Irish which followed this battle, see ORANGEMAN. The anniversary of the battle of the Boyne is celebrated on July 12.

BOYS, SHIPS'. In nautical language, all the young or green hands on board, so called without much reference to their age. In recent times, arrangements have been made to give a more precise meaning to the term by engaging boys or lads as part of the crew. There has

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been no such rating in the United States Navy since the establishment of the apprentice system, but it is still preserved in the British Navy.

BOYS' CLUBS. A term applied both to organizations formed by boys and to those maintained by adults on behalf of boys. An investigation, made by Dr. H. D. Sheldon in 1898, of 862 clubs formed by American boys between the ages of 10 and 17, revealed the following as to their purpose: Twenty-three were secret societies, 28 social ('good times'), 56 industrial, 10 philanthropic, 28 literary, art, and musical, 105 predatory (hunting, fighting, preying, etc.), 379 athletic and game clubs. The majority of these were started by boys of the ages 11, 12, 13, the numbers being, (11) 155; (12) 164; (13) 188. Eighty-seven per cent. of the clubs were formed by boys between the ages of 10 and 15, while 85½ per cent. stood for physical activity. It was found that interest in athletic organizations increased to the thirteenth year, then rapidly diminished; while interest in literary societies, etc., increased with maturity. Boys and girls seldom joined in forming clubs.

The underlying motives of boys' clubs promoted by adults are very different. It is sought to mold character, to remove boys from bad surroundings, to inspire to better things. These clubs are of two types. The earlier 'mass clubs,' which had their great development in the last half of the Nineteenth Century, up to about 1890, sought to get the boys off the streets, to furnish fitting opportunities for games, etc. In some clubs manual training was introduced. The clubs were large, numbering their members by hundreds. In some cities large club buildings have been erected. Such clubs have done much good work, but the personal relation of the leader to the individual boys is necessarily limited. This personal influence is the keynote of the second type, which came into existence with the social settlements, the first of which in the United States was started in 1889. The clubs are small (8 to 12 members), and hold regular meetings once or twice a week, the programme being varied to suit the boys' interests; or individual clubs take up specific courses. The boys are usually of one locality, and often are friends. Thus they are interested in each other, and the leader has a chance to come into close contact with them all. Both types exist in the cities, but the tendency is toward the small clubs. The large clubs tend also to become more of a federation of special clubs. Consult: Johnson, "Rudimentary Society Among Boys," in *Johns Hopkins University Studies*, 2d series, No. 11 (Baltimore, 1884); Sheldon, "The Institutional Activities of American Children," reprint (Worcester, 1899) from *American Journal of Psychology*, Vol. IX.; Birtwell, *Home Libraries* (Boston, 1899); Johnson, *Games and Play*, Social Work Monographs (Boston, 1898); Forbush, *How to Keep Boys* (Boston, 1900); ib., *The Boy Problem* (Boston, 1901); Newman, *The Boys' Club in Theory and Practice* (London, 1900).

BOYSSET, bwä'sâ', CHARLES (1817—). A French legislator, born at Châlon-sur-Saône. He entered the Legislative Assembly after the Revolution of 1848, and served until 1851, when he was banished in consequence of the coup d'état. In 1867 he returned to Paris, and in 1870 he was commissioned to organize the national defense in the departments of Côte-d'Or and Saône-et-Loire. He became a member of the Radical Republican Party in the Chamber of Deputies, where he proposed such measures as the separation of Church and State and the abrogation of the protectionist laws. He published the well-known *Catéchisme philosophique du XIX. Siècle* (1868), and has been collaborator with Proudhon on *Le Peuple*.

BOY'THORN, LAURENCE. In Dickens's *Bleak House*, a character supposed to represent Walter Savage Landor. He is the friend of Mr. Jarndyce, vigorous and almost ferocious in his manner, while really kind-hearted.

BOY'TON, PAUL (1848—). An Irish nautical adventurer, born in Dublin. In 1874 he began his aquatic performances, in which, clad in a rubber suit, he traversed long distances. His most extensive trip was that of 3580 miles from the mouth of Cedar Creek, Mont., to Saint Louis, Mo., September 17 to November 20, 1881. For an account of his various feats, consult his book, *Roughing It in Rubber* (1886).

BOZ. The pen-name of Charles Dickens in the set of papers now known as *Sketches by Boz*, which appeared in book form in 1836. The first number to which this name was signed appeared in the *Monthly Magazine* for August, 1834. Dickens's own explanation is interesting: "'Boz' was the nickname of a pet child, a younger brother (Augustus), whom I had dubbed Moses in honor of the Vicar of Wakefield; which being facetiously pronounced through the nose became Bŏses, and being shortened became Bŏz." Popularly, the 'o' came to be pronounced short, and Bŏz is now correct. The *Pickwick Papers* first appeared ascribed to 'Boz.'

BOZEMAN, bŏz'man. A city and county-seat of Gallatin County, Mont., 96 miles southeast of Helena, on the Gallatin River and on the Northern Pacific Railroad (Map: Montana, D 3). It is in a region which has valuable deposits of coal, gold, silver, and iron ore, and is the headquarters of large agricultural and stock-raising interests. The industrial establishments include flour-mills, lumber-mills, brick-yards, stone-quarries, breweries, etc. Bozeman is the seat of the State College of Agriculture and Mechanic Arts, opened in 1893, and contains a public library and fine county and municipal buildings. A canal, some 20 miles in length, has been constructed to serve both for irrigation and as a waterway. Population, in 1890, 2143; in 1900, 3419.

BOZEN, bō'tsen (It. *Bolzano*). A town of the Austrian Crownland of Tyrol, situated about 860 feet above sea-level, at the junction of the Talfer and the Eisach, about 83 miles south of Innsbrück (Map: Austria, B 3). It is well built, and protected from inundations of the Talfer by a strong wall about two miles in length, which at the same time serves as a pleasant promenade. The houses for the most part are built in the Italian style, many of them with arcades. The chief public buildings are the Gothic parish church, with a fine marble altar, the Rathaus, and the Franciscan Monastery. Its situation on the Brenner Railway, and at the junction of the roads from Germany,

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Italy, and Switzerland, makes Bozen an important centre of the transit trade. The most important articles are fruit and wine. There are factories for the canning of fruit and vegetables. Adjoining Bozen is the popular winter resort of Gries. Bozen appears as a Roman town as early as 378. In 1531 it came into the possession of Austria. Population, in 1890, 11,744; in 1900, 13,632.

BOZ'RAH. The name of two biblical cities, one a city of Edom, the other of Moab. (1) Bozrah, the capital of Edom (Gen. xxxvi. 33; Isa. xxxiv. 6, etc.). This city seems to be identical with El-Buseireh, north of Petra and southwest of Tufileh, in the District of Jebal. Jeremiah (xlix. 13, 22) and Amos (i. 12) prophesy the destruction of this city in their prophecies of the doom of Edom. (2) Bozrah of Moab, mentioned by Jeremiah in his prophecy of the doom of Moab (Jer. xlviii. 24), has not been certainly identified. It may be Bosrah esh-Sham, in the District of Hauran (Auranitis), the Bostra of the days of Trajan. This place is a vast collection of ruins, about 76 miles south-southeast of Damascus. In A.D. 105 the city was restored and beautified by Trajan, who made it the capital of the Province of Arabia. In the reign of Alexander Severus it was made a colony, and later it was the seat of a bishopric and of an archbishopric. During the Crusades it was held by the Mohammedans, and all attempts of the Crusaders to capture it were futile.

BOZZARIS, bō'tsä-rēs; popularly, bō-zär'ĭs, MARCO or MARCOS BOTZARIS (c.1790-1823). The 'Leonidas of Modern Greece.' He was born at Suli, in the mountains of Epirus, about 1790. After the Treaty of Tilsit, in 1807, he entered the French service, but in 1821 he threw himself into the Greek struggle for liberation, and at the head of a band of Suliotes took an active part in the engagements with the Turks, winning many victories. In 1822 he was defeated at Petta (in company with Prince Mavrocordatos), chiefly through treachery, and both the patriot leaders were obliged to take refuge at Missolonghi. This place valiantly held out until relieved by a Hydriote fleet. In 1823, in anticipation of an assault which he knew the fortifications of Missolonghi were too weak to withstand, he made a sudden sally upon the Turks during the night of August 20, at Karpenisi. The Turkish army was so far superior that its van alone was many times larger than the attacking party; but the Greeks threw the Turks into utter confusion and won a complete victory. The triumph was saddened by the loss of the heroic Bozzaris, who fell while leading on his men to the final attack. This battle has been made the subject of a poem by Fitz-Greene Halleck. Consult: Mendelssohn-Bartholdy, *Geschichte Griechenlands* (Leipzig, 1870-74); Hertzberg, *Geschichte Griechenlands* (Gotha, 1876-79).

BOZ'ZY. A rather contemptuous corruption of Boswell, the author of the *Life of Samuel Johnson.*

BRA, brä (It. dial., meadow). A city in the Province of Cuneo, North Italy, 900 feet above the sea, 31 miles south of Turin (Map: Italy, B 3). It has a church of irregular architecture (barocco), built by Vettone in 1742, and numerous educational and charitable institutions. A trade in silk, wine, cattle, truffles, and leather is carried on. Two miles to the southeast are the ruins of the ancient Pollentia (q.v.). Population, in 1881 (commune), 15,000; in 1901, 15,965.

BRABANÇONNE, brȧ'bȧN'sŭn' (Fr., the Brabantine, i.e. *chanson*, song; from the Province of Brabant), LA. The national song of the Belgians, originally sung by the insurgents during the Revolution of September, 1830. A young French player of the name of Jenneval was the author of the song, which was set to music by a singer named Campenhout. Jenneval fell in a combat with the Dutch at Berchem.

BRABANÇONS, brȧ'bȧN'sȯN'. A name applied during the later Middle Ages to mercenary soldiers. In 1135 William of Ypres raised bands of mercenaries in Brabant for Stephen of Blois, the claimant of the English crown. The name Brabançons, first applied to the hirelings from Brabant, was used later for mercenaries in general. Because of their deeds of rapine, Brabançons soon became a common name for brigands.

BRABANT. A province of Belgium, bounded on the north by the Province of Antwerp, on the east by Limburg and Liège, on the south by Namur and Hainaut, and on the west by East Flanders. Area, 1268 square miles. The surface is mostly level and well wooded. It is traversed by the Dyle, Dewer, and Senne, and has a well-cultivated soil. The manufacturing industries comprise the production of cotton and woolen goods, ribbons, linen, hats, jewelry, etc. Population, in 1899, 1,280,909. Capital, Brussels (q.v.).

BRABANT, brä'bant *or* brȧ-bȧnt', *Fr. pron.* brȧ'bȧN' (Lat. *Brachbantum;* Ger. *brach;* fallow, unplowed + *Band*, district). The name formerly given to an important region in the Low Countries, extending from the left bank of the Waal to the sources of the Dyle, and from the Meuse and the plain of Limburg to the Lower Scheldt. In the time of Cæsar Brabant was inhabited by a mixed race of Germans and Celts, but in the Fifth Century it came into the possession of the Franks. After the disruption of Charlemagne's Empire, it formed part of the Duchy of Lorraine (included in Germany), and after 959 of the Duchy of Lower Lorraine. The Principality of Brabant grew up around the city of Louvain as a nucleus. Beginning with Henry I. (1190-1235), the rulers of Brabant bore the title of duke. John I. in 1288 annexed Limburg to his dominions. The country possessed a liberal charter, known as the *Joyeuse Entrée*, or 'Joyous Entrance,' which guaranteed extensive rights to the nobles and the towns and restricted the powers of the Duke. In 1430 Brabant came into the possession of the House of Burgundy, and in 1477 passed to the Hapsburgs through the marriage of Mary of Burgundy with the future Emperor Maximilian. The northern part of Brabant participated in the revolt of the Netherlands against the rule of Philip II. of Spain, and became a part of the independent Dutch Republic. At the close of the Napoleonic wars the whole of Brabant was included in the Kingdom of the Netherlands, and was divided into three provinces. After the Revolution of 1830 the provinces of Antwerp and South Brabant became parts of Belgium.

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BRABANTIO, brä-băn'shĭ-ō. The father of Desdemona in Shakespeare's *Othello.* He is a Venetian noble, vehemently opposed to his daughter's marriage with the Moor.

BRAB'INE. The pseudonym of Thomas Barnibe, the letters of his name being shifted to form an anagram.

BRACCIO, brä'chō, FORTEBRAC'CI, Count of Montone (1368-1424). A celebrated condottiere, born in Perugia of an old patrician family. In his early youth he became a leader of mercenaries, and later was the champion of the exiled Perugian nobles. In 1408 he entered the service of Ladislas, King of Naples, who had designs upon Central Italy, and with his command crossed the Apennines, scoured the valley of the Tiber, and took several towns. In June of the same year the people of Perugia offered the dominion of their city to the Neapolitan King, on condition that he should prevent the return of the nobles. He accepted the offer, and Braccio was forced to retire to the marshes. In 1416, however, Braccio secured the possession of his native city, and the banished nobles were restored. In 1417 he took Rome, but was soon obliged to evacuate it. Soon afterwards he made terms with Pope Martin V., and subsequently accepted from Joanna, Queen of Naples, the command of her land forces, and the rank of High Constable of the Kingdom. He entered the Abruzzi, surprised Capua, and relieved Naples. In 1421 he became Prince of Capua and Count of Foggia. Braccio aspired to the throne of Naples; in 1424 he overran Campania and Apulia, took Bari, and advanced into Calabria, but was wounded and captured, while besieging Aquila, and died June 2, 1424. His deeds and those of his contemporary, Piccinino, are commemorated by Lorenzo Spirito, in a poem entitled *L'altro Marte* (Vicenza, 1489).

BRACCIO NUOVO, nwō'vō. An imposing vaulted hall in the Vatican, built in 1821, containing about 120 works of ancient sculpture, among them the "Apoxyomenos," the "Augustus," the "Nile Group," and the "Athlete."

BRACCIOLINI, brä'chō-lē'nē, FRANCESCO (1566-1646). An Italian poet, born in Pistoia. He was appointed secretary to Cardinal Maffeo Barberini, afterwards Pope Urban VIII., and won renown by his *Croce racquistata* (The Cross Regained, 1605), then ranked by many critics as second only to Tasso's *Gerusalemme.* He wrote also a famous satire on the heathen divinities of the ancient world, entitled *Lo scherno degli Dei* (The Scorn of the Gods, 1618). His other publications include a poem celebrating the elevation of Urban VIII. to the Pontificate (Rome, 1628), and three tragedies.

BRACCIOLINI, POGGIO. See POGGIO BRACCIOLINI, GIOVANNI FRANCESCO.

BRACE (OF. *brace, brasse,* the two arms, embrace, from Lat. *brachia,* plur. of *brachium,* arm). A beam or bar in a roof or bridge-truss placed in an inclined position, and serving to hold together the principal members; generally any timber used to stiffen a framed structure. The contrivance or tool for holding a bit, and used by carpenters for boring, is also called a brace. (See BRIDGES; ROOFS; BORING-MACHINERY.) Braces on shipboard are ropes attached to the yard-arms, and employed to shift the sails in a horizontal direction round the masts, so as to receive advantageously the wind that may be blowing at any particular moment. To *brace in* is to bring the forward yard-arm farther aft—that is, to lay the yard more nearly square; to *brace up* is the reverse of this; to *brace about* is to swing the yard from being sharp up (i.e. as far forward as possible) on one tack to sharp up on the other. In construction of all kinds the term 'brace' signifies a form of prop which supports by resistance to compression as opposed to a strut, tie, or hanger, which supports by resistance to tension.

BRACE, CHARLES LORING (1826-90). An American philanthropic author. He was born at Litchfield, Conn., June 19, 1826, graduated at Yale, studied in the Yale and in the Union Theological Seminaries, but never had charge of any church. In 1850 he made a pedestrian tour in Great Britain, and the next year went to Hungary. Afterwards he studied the school systems of Switzerland, England, and other countries. On his return in 1852 he became associated in the early operations of the 'New York Children's Aid Society,' and as secretary of that society did a great work among newsboys and in ridding New York City of unruly children. He became widely known as a philanthropist. He died at Campfer, in the Engadine, Switzerland, August 11, 1890. He visited Europe often, and the result of his observations is found in *Hungary in 1851* (New York, 1852); *Home Life in Germany* (1853); *Norse Folks* (1857); *Races of the Old World* (1863), etc. He also published *The New West* (1868); *Short Sermons to Newsboys* (1861); *Dangerous Classes of New York* (1872); *Gesta Christi* (1883); and *The Unknown God* (1889). Consult his life, ed. by his daughter (New York, 1894).

BRACE, DE WITT BRISTOL (1859—). An American physicist, born in Wilson, N. Y. He graduated at the Boston University in 1881, received the degree of M.A. there a year afterwards, studied at Johns Hopkins University from 1881 to 1883, and received the degree of Ph.D. from the University of Berlin in 1885. He was appointed acting assistant professor at the University of Michigan in 1886, and became professor of physics at the University of Nebraska in 1887. He has made a special study of radiation and optics, and has published *Laws of Radiation and Absorption* (1901).

BRACE'BRIDGE HALL, or THE HUMORISTS. The title of a volume of essays by Washington Irving (1822). Bracebridge Hall was taken as a type of the English country-seat, and the stories bring us a breath of its genial air. It appeared under the name of 'Geoffrey Crayon, Gent.'

BRACE'GIR'DLE, ANNE (?1663-1748). An English actress. She was said to have been brought up by Mr. and Mrs. Betterton, and to have appeared as a child in *The Orphan,* at Dorset Garden, but her early history is not well known. She took the part of Lucia in Shadwell's *Squire of Alsatia* at the Theatre Royal in 1688, and from that time is frequently on record. In 1693 she played Araminta in Congreve's *Old Bachelor.* In 1695 she joined Betterton, Mrs. Barry, and the other seceders to Lincoln's Inn Fields, and played Angelica in *Love for Love.* She was Belinda in Vanbrugh's *Provoked Wife,* and the same year (1697) Almeria in Congreve's

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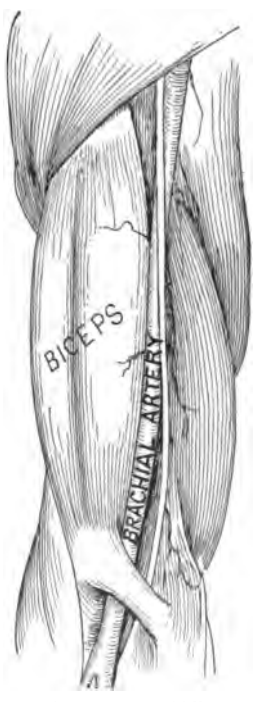
Mourning Bride. Among her characters were several tragic parts, but she was thought at her best in comedy. Her personal attractions were famous. Cibber says of her: "Never was any woman in such general favor of her spectators, which to the last scene of her dramatic life she maintained by not being unguarded in her private character." The last curious phrase has been much quoted, and met with some debate. Mrs. Bracegirdle's reputation for a virtue then not too common upon the stage seems, however, to have been well sustained. She was the innocent cause of the death of Mountfort, who was killed by a jealous Captain Hill and Lord Mohun. Cibber adds, "Scarce an audience saw her that were less than half of them lovers, without a suspected favorite among them." It was half believed, nevertheless, that she was privately married to Congreve. A purse of £800 was once given her by Lord Halifax and some friends as a testimonial to her character. She was noted besides for her charity to the poor. Her retirement from the stage, in 1707, was owing to jealousy of the popularity of Anne Oldfield, and she played thereafter but once, at Betterton's benefit in 1709. Consult: Doran, *Annals of the Stage*, ed. Lowe (London, 1888); Russell, *Representative Actors* (London, 1875); Baker, *English Actors* (New York, 1879); and Cibber, *Apology*, chap. v., ed. Bellchambers (London, 1822).

BRACELET (Fr., armlet, from *bras*, hand, Lat. *bracchium*, arm, Eng. *brace*). An ornament worn on the arm, generally at the wrist. Bracelets and armlets have been used by every nation, both savage and civilized, from the earliest periods to our own. They are frequently mentioned in Genesis, as worn both by men (xxxviii. 18) and by women (xxiv. 30); by both the Hebrews and the surrounding nations (Num. xxxi. 50). Similar ornaments were worn round the ankles, but they are stigmatized by Isaiah as marks of luxury (iii. 16). The Medes and Persians were remarkable, even among Asiatics, for their love for ornaments of this class. They wore not only bracelets and armlets, but earrings, collars, and necklaces, which often consisted of strings of valuable pearls, or were enriched with other jewels. These ornaments were used to indicate the rank of the wearer, and this use has continued to be made of them in the East down to the present day. In Europe, bracelets and armlets were worn by both the classical nations and the barbarians from the earliest times. The Gauls wore them; and the Sabines, in the legend of Tarpeia, had ponderous golden armlets on the left arm. Armlets have been found at Troy, Mycenæ, and in the early Italian graves. They were worn on both the lower and upper arm, and are frequently found in pairs. In historical times it was a mark of effeminacy for men to wear bracelets, but they are very frequently seen on women in works of art, and very many have been found in tombs. Some of these are exceedingly beautiful specimens of the goldsmith's work. The favorite form seems to have been a spiral passing several times around the arm, and frequently made to resemble a serpent. We also find simple rings, often open, with the ends in the form of animals' heads, sphinxes, etc. Almost all modern forms can be found among the Greek and Etruscan jewelry. These armlets were frequently arranged to contain amulets. Among the Romans, silver armlets (*armillæ*) were given to soldiers or centurions as a mark of distinction.

BRACHELLI, brä-kĕl'lē. Hugo Franz von (1834-92). An Austrian statistician. He was born in Brünn, and studied at the University of Vienna. He published the important statistical work *Die Staaten Europas* (1853). He was appointed director of the statistical department of the Austrian Ministry of Commerce in 1872. Among his more important works are *Die Deutsche Staatenkunde* (1856) and *Statistische Skizzen* (1892).

BRACHET, brä'shā', Auguste (1844—). A French philologist. He was born in Tours, and studied under Diez and Littré. In 1870 he was appointed professor of Romance philology at the Ecole des Hautes Etudes, Paris, and from 1872 to 1874 he was professor of German in the Ecole Polytechnique. His *Dictionnaire étymologique de la langue française* (Paris, 1870), in two volumes, has frequently been reprinted. It has been translated into English, and has been introduced into the universities of Cambridge, Oxford, London, etc. His *L'Italie qu'on voit et l'Italie qu'on ne voit pas* (1881) is one of several publications in which Brachet endeavors to show that the education of the youth of Italy is everywhere influenced by a pronounced antagonism to France and the desire of a closer alliance with Germany.

BRACHIAL (brā'kĭ-*a*l) **ARTERY** (Lat. *brachialis*, belonging to the arm, from *brachium*, arm). The artery between the armpit and the elbow, which is the continuation downward of the axillary artery. The brachial artery at first runs along the inner side of the arm, just behind the inner margin of the biceps muscle and behind the great median nerve. Here it may be pressed against the bone, in cases of bleeding from any point below. Then it passes across to the front and outer side of the arm. In its course, the brachial artery gives off (1) the superior profunda branch, which winds round the back of the arm-bone, and reappears on the outer side, where it joins some twigs coming up from the radial artery; (2) an artery which enters the bone to supply its medullary membrane; (3) the inferior profunda, which, running down behind the internal condyle of the humerus, joins branches coming from the ulnar artery; (4) a short branch, the anastomotica magna, which breaks up into numerous branches inosculating around the elbow.



BRACHIAL ARTERY.

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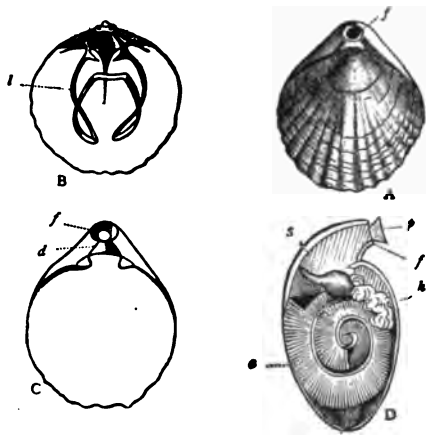
BRACHIANO, brä-chä′nō, DUKE OF. The name of a character in the tragedy *The White Devil*, by John Webster (1612).

BRACHIOPODA, brăk′ĭ-ŏp′ō-dä (Gk., arm-footed, from βραχίων, *brachiōn*, arm + πούς *pous*, foot). A class of peculiar animals, having bivalve shells, but differing in important points from the vast majority of recent mollusks with bivalve shells. The mantle or pallium (see MOLLUSCA) in the brachiopods consists of two broad expansions or lobes, covered by the two valves of the shell, which are dorsal and ventral, and inclosing all the other soft parts of the animal; while the chief function of these folds is unquestionably the formation of the two-shell valves, it is possible that they are supplied with blood lacunæ or vessels, and may serve as the principal organs of respiration. The circulatory system is not satisfactorily known, but there is probably a vascular system present, with a heart placed above the intestine. The nervous system is weakly developed, but includes a small brain and a



ANATOMY OF BRACHIOPODA.

Structure of Terebratula. A, The shell viewed from behind, showing the dorsal valve, and the perforated summit of the ventral valve above it. B, Inner view of the dorsal valve, showing the shelly loop (*l*) which supports the spiral arms. C, Inner view of the ventral valve, showing the foramen or aperture (*f*) in the beak, through which (*d*) the muscular stalk of attachment passes. D, Longitudinal and vertical section of the animal, showing the spiral arms (*a*), the stomach (*s*), and the liver (*h*). At *f* is the opening in the beak, with the stalk of attachment (*p*) passing through it. (After Davidson and Owen.)

larger infra-œsophageal ganglion, with two principal trunks running backward from it. There are no special sensory organs of any kind. The organs by which food is procured are also remarkable—two long arms arising from the sides of the mouth, and disposed wholly or partly in spiral curves, when not extended to seek or seize prey. These arms are usually furnished with numerous vibratory filaments, which are supposed not only to aid in the capture of prey, but in the maintenance of the current necessary for respiration. The arms are often supported by a special calcareous skeleton, attached to the dorsal valve.

Excretion takes place by means of nephridia, of which one or two pairs are present; these also serve as ducts for the transmission of the sexual products. They open into the mantle-cavity on each side of the mouth. The Brachiopoda are attached to solid bodies either by a footstalk or by one of the valves of the shell. When the stalk is present it emerges either between the valves or through a hole in the posterior upward bulging of the larger ventral valve. The Brachiopoda are most notable because of the fact that in the earliest geological times they were a dominant type; but since the close of the Paleozoic Age they have been steadily decreasing in number. More than 4000 species are known, but more than 95 per cent. are extinct and exist only as fossils. Most of the living brachiopods are small, less than an inch across, but some of the extinct forms were six inches across. All living species are marine, and there is every reason to believe the same is true of the extinct species. Existing species are found in water of moderate depth, sometimes down to 250 fathoms. They are generally grouped in two orders: the *Articulata*, or Testicardines, in which the shell-valves are hinged and the anus is wanting, and the *Inarticulata*, or Ecardines, without hinge but with the intestine having an anus. Of the latter one genus has existed almost unchanged from earliest geological time down to the present day. The position of the Brachiopoda has long been a matter of dispute, but they are now usually placed in the phylum Molluscoida (q.v.), though their relationship to other classes is very obscure.

BRACHIOSPONGIA, brăk′ĭ-ō-spŏn′jĭ-ä (Gk. βραχίων, *brachiōn*, arm + σπογγιά, *spongia*, sponge). A curious genus of hexactinellid sponges. This sponge has a form somewhat like that of the earth-star puffball (*Geaster*), and consists of a central depressed hollow portion from which radiate several cylindrical arms that are bent downward toward the ocean-floor upon which the sponge lived. Into these arms extend prolongations of the central gastral cavity. The aperture of the gastral cavity is large and often elevated above the plane of the arms. These sponges have been found chiefly in the Ordovician rocks of Franklin County, Ky., where they occur as hard, stony masses. The stony nature is due in part to a compact skeleton of delicate siliceous spicules that gave rigidity to the sponge mass when alive, and also to mineral matter that has been deposited in the cavities of the skeleton during the progress of petrifaction. Consult Beecher, "Brachiospongidæ," *Memoirs of the Peabody Museum of Yale University*, vol. ii., pt. i. (New Haven, 1889). For illustration, see article on SPONGE, FOSSIL.

BRACHISTOCHRONE, brä-kĭs′tō-krōn (Gk. βράχιστος, *brachistos*, shortest + χρόνος, *chronos*, time), or the curve of quickest descent. See CYCLOID.

BRACHT, bräkt, FELIX PROSPER EUGEN (1842—). A German painter, born at Morges (Lake Geneva, Switzerland). He was a pupil of Frisch and Seeger in Darmstadt, of the Karlsrühe Art School, and of Gude in Düsseldorf. In 1882 he became a professor in the Berlin Academy. He has painted chiefly landscapes, drawing his motives from the Lüneburg Heath, the island of Rügen, Syria, and Palestine. In 1889 he received the gold medal of the Berlin Exhibition. He is extremely skillful in interpreting by a few significant strokes the local moods of various diverse regions. Among his works are "Giant's Grave on the Lüneburg Heath," "Stormy Evening on Rügen," "Shepherd on the Heath," "Moon-

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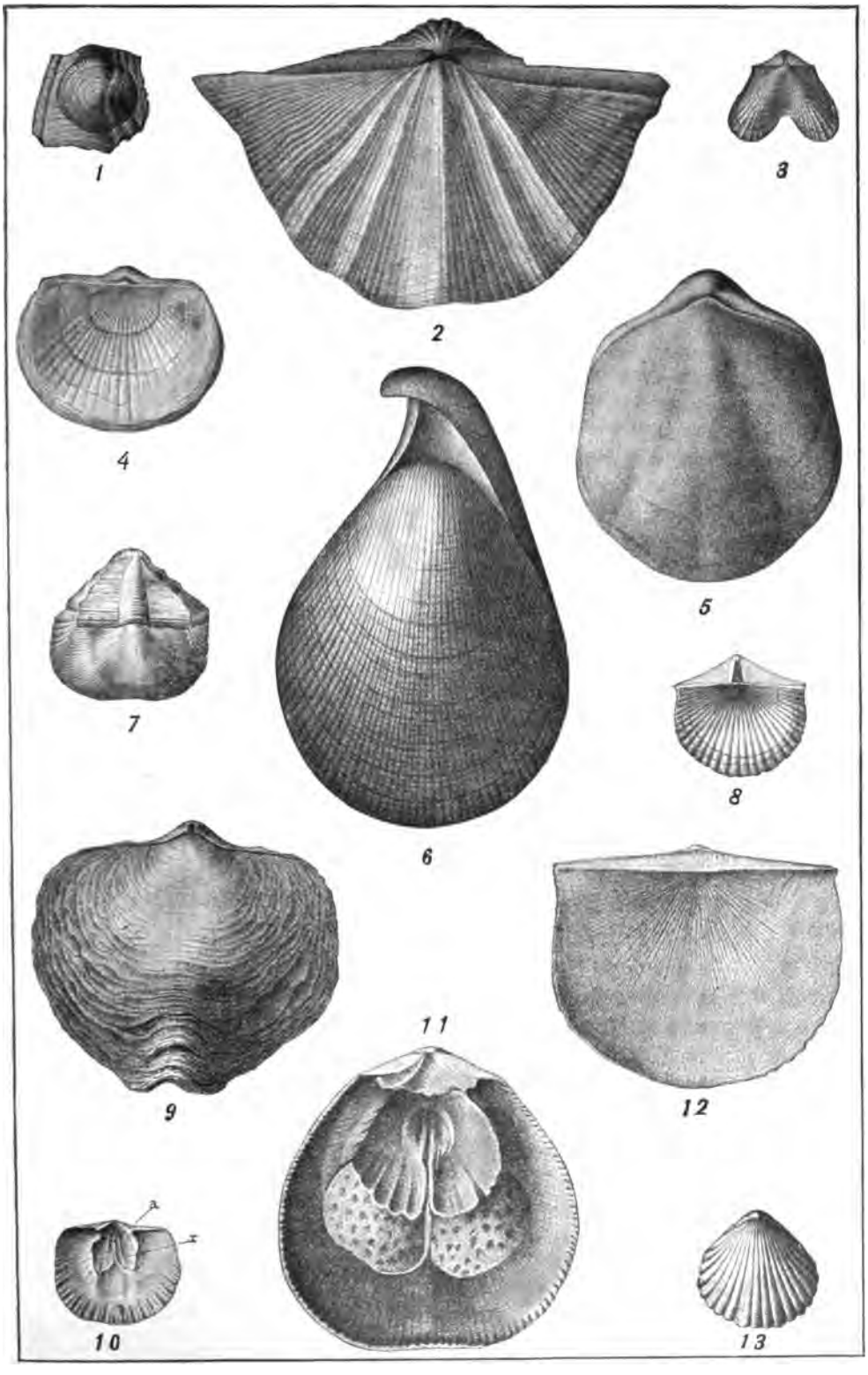

For Names and Descriptions see Article.

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light Night in the Desert," and "Nightfall on the Dead Sea," the last, now in the National Gallery in Berlin, being esteemed his best. He is also known as a water-colorist.

BRACHVOGEL, brăk'fō'gel, EMIL (1824-78). A German dramatist and writer of fiction, born in Breslau. He studied engraving and modeling, but having subsequently turned author, wrote several dramas and a large number of long-winded works of historical fiction. The dramas include *Narciss* (1857, 6th ed., 1882), translated into several European languages, on which his reputation rests. Among his novels may be mentioned *Benoni* (1860); *Beaumarchais* (4 vols., 1865); and *Glancarty* (4 vols., 1872). His *Ausgewählte Werke* appeared at Berlin in 1873.

BRACHYLOGUS, brā-kĭl'ō-gŭs (Gk. βραχύς, *brachys*, short + λόγος, *logos*, word). A work containing a systematic exposition of the Roman law, compiled probably in the Twelfth Century, though some assign it to the reign of Justinian. The earliest extant edition was published at Lyons in 1549. It is based on the Institutes of Justinian, though it is drawn largely from the Digest and other parts of the Corpus Juris (q.v.).

BRACHYURA, brăk'ĭ-ū'rā. See CRUSTACEA; CRAB; SPIDER-CRAB.

BRACIDAS, brăs'ĭ-das. In Spenser's *Faerie Queene*, the twin brother of Amidas. Lucy, the forsaken love of Amidas, throws herself into the sea and drifts in a floating chest to the island of Bracidas. When the chest is found to contain treasure, it is claimed by Amidas, but the dispute is settled in Lucy's favor by Sir Artegal.

BRACK'ENBURY, Sir HENRY (1837—). An English soldier; director-general of ordnance at the War Office, since 1899. He was born in Lincolnshire, England, and in 1856 joined the Royal Artillery. He served in the Central Indian campaign (1857-58) and in the Ashanti campaign (1873-74), and was chief of staff during the Zulu War (1879-80). Subsequently he was military attaché at Paris (1881-82); accompanied the Nile Expeditionary force as deputy adjutant-general (1884), and, after the death of General Earle, took command of the River Column. For his services he was made major-general (1885). He became lieutenant-general in 1888, and colonel commandant of the Royal Army in 1897. Sir Henry's publications include *Fanti and Ashanti* (1873); a *Narrative of the Ashantee War* (1874); and *The River Column* (1885).

BRACK'ENRIDGE, HENRY MARIE (1786-1871). An American lawyer and author, son of Hugh Henry Brackenridge (q.v.). He was born in Pennsylvania; practiced law in Maryland, and in 1812 became district judge of Louisiana, in which position he was useful to the Government in the War of 1812, of which he wrote a history. He advocated the acknowledgment of the independence of the South American States, and his pamphlet on the subject received an official answer from the Spanish Minister at Washington. Subsequently he was commissioner to the new republics, and published *A Voyage to South America* (1818). He was judge of the western district of Florida for ten years and then removed to Pittsburg, Pa. In 1841, he was commissioner under the treaty with Mexico. Besides many essays on various subjects, he published *Recollections of Persons and Places in the West* (1834), and a *History of the Western Insurrection* (1859), written in vindication of his father.

BRACKENRIDGE, HUGH HENRY (1748-1816). An American lawyer, politician, Revolutionary chaplain, poet, satirist, and miscellaneous writer, born at Campbelton, Scotland. Brackenridge was graduated from Princeton in 1771, a classmate of James Madison. Part of the graduating exercises of that year was a poetical dialogue, *The Rising Glory of America*, written by Brackenridge in collaboration with Philip Freneau (q.v.), and published in 1772. For five years he taught at Princeton and in Maryland, writing for his pupils a drama, *Bunker Hill*, published in 1776, in which year he went to Philadelphia as editor of the newly founded *United States Magazine*. Brackenridge, who had studied divinity, then became chaplain in the Revolutionary Army, though never regularly ordained. Six of his *Camp Sermons* were published. He soon left the army, however, and, after studying law at Annapolis, was admitted to the bar, moved to Pittsburg, became prominent politically, and in 1786 was sent to the Legislature. He was active as a mediator in the Whisky Insurrection (1794), and wrote, as a defense of his action, *Incidents of the Insurrection in Western Pennsylvania* (1795). In 1799 he was made judge of the State Supreme Court. The best known of his publications, the only one of present literary interest, is a political prose satire, *Modern Chivalry, or the Adventures of Captain Farrago and Teague O'Regan, his Servant* (1796-1806). Brackenridge died at Carlisle, Pa., June 25, 1816. His miscellaneous verse and prose shows him to have been a man of much versatility and intelligence.

BRACKET (ME. *bragget*, Fr. *braguette*, dimin. of Lat. **braca*, sing. of *bracæ*, breeches). A projection from a wall, with a flat top, used to support anything. It differs from a corbel (q.v.) in being separate from and not a part of the wall. Brackets are ordinarily of stone, wood, or metal, and are occasionally elaborately designed and carved. They sometimes support heavy weights, such as balconies, oriel windows, projecting upper stories, or roofs, where they may form a portion of the vertical overhanging. More frequently brackets serve to hold statues, busts, vases, lamps, or the like. The term is also employed for the cast-iron or plain wooden supports of shelves, cupboards, etc., as well as for gas or electric lights projecting from the wall.

BRACKET FUNGI. Certain fungi taking the form of brackets on trees and stumps. They belong to the group Basidiomycetes (q.v.).

BRACK'ETT, FRANK PARKHURST (1865—). An American mathematician and astronomer; born at Provincetown, Mass. He graduated at Dartmouth College in 1887, and in 1890 was appointed professor of mathematics and astronomy at Pomona College (Claremont, Cal.). He has published monographs on subjects connected with mathematics and meteorology.

BRACK'ETTVILLE. The county-seat of Kinney County, Tex., 225 miles southwest of the State capital, Austin (Map: Texas, D 5). It has stock-raising interests. It is the seat of a United States military post, Fort Clark, which was garrisoned in 1902 by four companies of cavalry and two of coast artillery. The post was once

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of much importance in repressing Indian and Mexican raids from beyond the Rio Grande. Population, about 1500.

BRACQUEMOND, brăk'môn', Joseph Félix (1833—). A French painter and engraver. He was born in Paris, and was a pupil of Guichard. He began to exhibit in the Salon of 1852, and soon won fame by his original etchings and his reproductions of the works of the great masters. He is especially successful in portraits, among which are many of noted artists and writers, and has also distinguished himself as an illustrator. His etching work is represented by over 800 plates, including a number of excellent lithographs. About 1867 he introduced successfully a new mode of decoration on china, and in 1872 became connected with the painting department of the porcelain factory at Sèvres, but soon afterwards established a studio for ceramic decoration on the outskirts of Paris, and has done a great deal of work for a Limoges factory.

BRACT (Lat. *bractea*, a thin plate of metal, gold-leaf). The leaves in an inflorescence, which are usually smaller than the ordinary leaves and often more or less modified in structure. See Inflorescence.

BRAC'TON, or **BRATTON**, Henry de (?—1268). An English ecclesiastic, distinguished as a judge and as the author of the first comprehensive treatise on English law. He was born at Bretton-Clovelly, in Devonshire, and studied at Oxford, where he took the degree of doctor of laws, and where he is supposed to have lectured on the canon law. He became an itinerant judge in 1245, and shortly thereafter a judge of the King's Court. His ecclesiastical and judicial preferment went hand in hand. In 1263 he was Archdeacon of Barnstable and Chancellor of Exeter Cathedral, and in 1265 he is said to have become chief justiciary of England under Henry III. Of his history subsequently to 1267 we know nothing. His fame rests on his great work on the laws of England, *De Legibus et Consuetudinibus Angliæ*, which has been characterized as "the crown and flower of English mediæval jurisprudence" (Pollock and Maitland, *History of English Law*, 2d ed., Cambridge, Eng., and Boston, 1899). It is a systematic treatise on a large and comprehensive plan, not wholly completed, drawing its form from the Roman law, but deriving its substance almost entirely from the precedents of the English law courts. The charge that the book is an indiscriminate mixture of Roman and English law, that it represents an attempt to refine and improve the common law by introducing the conceptions of the civil law, has been disproved by recent investigations of the plea rolls and other authorities upon which he relied. The work was an immediate success. Some fifty manuscripts of it have come down to us, and in that age of legal activity it became the model of numerous other treatises, some of which, like Fleta and Britton, have also survived. But Bracton had no successor until, 500 years after his death, Blackstone gave his *Commentaries* to the world. The earliest edition of Bracton's *De Legibus* is the folio edition of 1569; the best edition is the one edited by Sir Trovers Twiss, and issued in 1878-83, with an English translation, under the authority of the lords commissioners of the treasury, and under the direction of the master of the rolls. Certain British Museum manuscripts containing the record of some 2000 cases were discovered about 1884 by Prof. Paul Vinogradoff to have been compiled by Bracton as a 'Note Book,' and were edited by F. W. Maitland for publication. Consult: *Bracton's Note Book*, edited by Maitland (London, 1887); *Select Passages from Bracton and Azo*, edited for the Selden Society by Maitland (London, 1895); Pollock and Maitland, *History of English Law* (2d ed., Cambridge, Eng., and Boston, 1889); Scrutton, *Influence of the Roman Law on the Law of England* (Cambridge, Eng., 1885).

BRA'CY, Maurice de. A captain of free lances in Scott's novel *Ivanhoe*. He instigates the carrying off of Rowena and assists in the defense of Front de Bœuf's castle. He is finally exiled by King Richard.

BRAD'AMANT. The daughter of Amon and Beatrice and the sweetheart of Roger the Moor. The latter becomes a Christian on her making this act a condition of their marriage. Bradamant, known as the Virgin Knight, had white armor and an irresistible spear. She appears in Boiardo's *Orlando Innamorato* and Ariosto's *Orlando Furioso*. There is a play with the title *Bradamante*, a tragi-comedy by Robert Garnier (1580); a tragedy by La Calprenède (1636); a tragedy by Thomas Corneille (1695), besides several others.

BRAD'BURY, John Buckley (1841—). An English physician and author. He was born at Saddleworth, Yorkshire, and was educated at King's College, London, and at Cambridge. He became physician to Addenbrooke's Hospital, Cambridge, in 1869; Bradshaw lecturer at the Royal College of Physicians, London, in 1895; Croonian lecturer to that body in 1899, and examiner in materia medica in the University of Oxford. His publications include: *On Vertigo: Its Causes, Importance as a Symptom, and Treatment* (1870); *Inaugural Lecture on Pharmacology* (1894); and *On Some New Vaso-Dilators* (1895).

BRADBURY, William Batchelder (1816-68). An American musician and composer, born in York, Maine. He was author in whole or in part of many books for Sunday schools and choirs, among which are *The Shawm* (1864); *The Jubilee* (1865); *The Temple Choir* (1867); *The Golden Chain* (1861); *Fresh Laurels* (1867), and *The Keynote* (1863). His works have had much popularity.

BRAD'DOCK. A borough in Allegheny County, Pa., 10 miles east of Pittsburg, on the Monongahela River, and on the Pennsylvania, the Baltimore and Ohio, and the Pittsburg and Lake Erie railroads (Map: Pennsylvania, B 3). It has extensive manufactures of steel, wire, ferromanganese, pig iron, steel rails, cement, and plaster. Braddock has a (Carnegie) free library of 2300 volumes and Kenneywood Park. Settled probably about 1795, on the site of Braddock's defeat in 1755, Braddock was incorporated in 1867. The borough is governed by a burgess, holding office for three years, and a council in whose power rests the appointment of the important officials of the city. The waterworks are owned and operated by the borough. Population, in 1890, 8561; in 1900, 15,654.

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BRADDOCK, EDWARD (1695-1755). A British general, who in 1755 led an expedition against Fort Du Quesne, in the French and Indian War (q.v.). With a force of 1200 picked men, regulars and provincials, he reached the Monongahela, a branch of the Ohio, on July 8. Disregarding the advice of Franklin and Washington, of the probability of a surprise, he advanced on July 9 in confident security until, when seven miles from the fort, the force was ambushed by Indians and attacked simultaneously in front by the French. Complete rout ensued, as the British were cut to pieces, until the survivors, less than half of the command, were led to safety by Colonel Washington, one of the General's aids. Braddock himself, while striving to re-form his men, was mortally wounded and died a few days later at Great Meadows, 50 miles away, whither he had been carried after the defeat. Consult: *The History of the Expedition Against Fort Du Quesne in 1755, Edited from the Original Manuscripts*, by Winthrop Sargent (Philadelphia, 1855), and Parkman, *Montcalm and Wolfe* (Boston, 1884).

BRAD'DON, MARY ELIZABETH (1837—). An English novelist; born in London. In 1860 she wrote a comedietta called *The Loves of Arcadia*, and the year after published *Garibaldi and Other Poems*. Her first great success, however, came with the publication, in 1862, of *Lady Audley's Secret*. This has since been extended by the appearance of *Aurora Floyd* (1863); *Eleanor's Victory* (1863); *John Marchmont's Legacy* (1863); *The Doctor's Wife* (1864); *Sir Jasper's Tenant* (1865); *Only a Clod* (1865); *The Trail of the Serpent; The Ladies' Mile* (1866); *Birds of Prey* (1867); *Run to Earth* (1868); *Dead-Sea Fruit* (1868); *The Lovels of Arden* (1871); *To the Bitter End* (1872); *Strangers and Pilgrims* (1873); *Weavers and Weft* (1877); *Mount Royal* (1882); *One Life, One Love* (1890); *All Along the River* (1893); *London Pride* (1896); *Under Love's Rule* (1897); *In High Places* (1898); *Rough Justice* (1898); *His Darling Sin* (1899); *The Infidel* (1900). She was married to John Maxwell, a London publisher, in 1874.

BRAD'FORD (AS. *brād*, broad + *ford*, ford). An important manufacturing city in the West Riding of Yorkshire, England, on a tributary of the Aire, eight miles west of Leeds (Map: England, E 3). Among the notable public buildings are the Church of Saint Peter, dating from 1485, the Exchange, the Town Hall, Piece Hall, and Saint George's Hall (a concert hall seating some 4000 people). Bradford has been a parliamentary borough since 1832 and returns three members to Parliament. The city's affairs are administered by a mayor, a municipal council of 64, and board of Aldermen of 21 members. The municipal authorities, imbued with a progressive spirit, have done much to make the city a business-like and modern municipality. The city owns its own waterworks, on which it expended about $18,000,000 to get a modern system fully equipped for the needs of the population. It also supplies with water several neighboring towns. The city maintains four stations where by means of 'destructors' the garbage is utilized for the manufacture of mortar, paving-slabs, etc. A special filtering plant receives the sewage, which is converted into manure, the sale of which helps to reduce the city rate. The municipality has owned its gas-works since 1871. They net annually about $100,000. Bradford was one of the first towns to municipalize the electric lighting, and has made a substantial annual profit therefrom. Among other municipal institutions are public markets and slaughter-houses, public baths, two cemeteries, and a 'conditioning house' for testing the quality of raw wool and woolen goods, certificates as to their quality being issued.

Bradford has seven parks and numerous small recreation grounds. It has an excellent public school system, the United Yorkshire Independent College, a Technical College, a mechanics' institute, several public circulating libraries, and an art museum. Among its benevolent and charitable institutions are several hospitals, including one for fever patients, a blind and a deaf-and-dumb asylum, and an orphan asylum. Bradford is the chief seat in England of the spinning and weaving of worsted yarn, and the great mart for the long wools used in worsted fabrics. Cottons are also manufactured. It manufactures silk, velvet, and plush. Bradford is the seat of a United States consulate; in 1895 its exports to the United States amounted to $3,000,000 in value; they have since decreased considerably, owing to the McKinley protective tariff. In the vicinity coal and iron are mined, and the city has several extensive iron-foundries. Bradford is on four railway lines and on the Bradford Canal. Its street railways are owned by the corporation, but are operated by private companies, with the exception of a short section of trolley line operated by the city. Baptists, Independents, and Wesleyans have colleges near the town. The first English temperance society was inaugurated at Bradford. The Romans seem to have worked iron-mines here, Roman coins having been found in foundry refuse near the town. The manor of Bradford, after the Conquest, was held in turn by the De Laceys, the house of Lancaster, the Crown, and the Corporation of London. During the Civil War the citizens of Bradford sided with Parliament, and twice defended the town successfully against the Royalists, but were forced to surrender to the Earl of Newcastle in 1643. Sir Titus Salt (q.v.), the founder of the famous manufacturing village near Shipley, called Saltaire, was a merchant of Bradford and at one time its mayor. Population, in 1891, 265,728; in 1901, 279,809.

BRADFORD. A city in McKean County, Pa., 76 miles south of Buffalo, N. Y.; on the Pennsylvania, the Erie, the Buffalo, Rochester and Pittsburg, and several local railroads (Map: Pennsylvania, C 2). It is in a petroleum and natural-gas region; has a large trade in oil and lumber, and extensively manufactures refined oil, oil-well tools, boilers, gas-engines, hardwood rims, air-compressors, motor cycles, and various wood products. The city contains school and public libraries, and a well-equipped city hospital. The Kinzua Bridge, 14 miles distant, is 300 feet high and 2100 feet long. Settled in 1823, Bradford was chartered as a city in 1879. The government is administered by a mayor, elected every three years, and a bicameral city council which controls nearly all of the important appointive offices. The city owns and operates its water-works, and is supplied with natural gas in

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abundance for fuel and lighting purposes. Population, in 1890, 10,514; in 1900, 15,029.

BRADFORD, ALDEN (1765-1843). An American writer; born in Duxbury, Mass. He graduated at Harvard in 1786; was minister of a Congregational Church in Wiscasset, Maine (1793-1801); was Secretary of State for Massachusetts (1812-24), and, in 1826, edited the *Boston Gazette*. Among his publications are: *A History of Massachusetts, from 1764 to 1820* (1822-29); *Life of Jonathan Mayhew* (1838); *History of Federal Government* (1840); and *New England Chronology, 1497-1800* (1843).

BRADFORD, AMORY HOWE (1846—). An American clergyman. He was born at Granby, N. Y.; graduated in 1867 at Hamilton College, and in 1870 at Andover Theological Seminary, and in the latter year became pastor of the First Congregational Church, Montclair, N. J. With the Rev. C. F. Deems, he organized the American Institute of Christian Philosophy. He founded the Whittier House Social Settlement of Jersey City, and was a founder of the Congregational Club of New York. In 1895 he was a member of the deputation sent by the American Board of Foreign Missions to investigate mission work in Japan. He is an editor of the *Outlook*, of New York, and has published, besides many contributions, chiefly theological, to the *Andover Review* and other periodicals, *Spirit and Life* (1892); *Old Wine: New Bottles* (1892); *The Pilgrim in Old England* (1893); *The Growing Revelation* (1897); *Heredity and Christian Problems* (1895); *The Age of Faith* (1901).

BRADFORD, JOHN (c.1510-55). An English minister, born in Manchester. He was secretary to the paymaster of the English forces in France, and was accused of using money not his own because he made restitution of a sum of money which his master had unlawfully taken. In 1547 he began to study law, but turned to the study of divinity, and became a fellow of Pembroke Hall, Cambridge, in 1549, and prebendary of Saint Paul's, London, in 1551. He was also chaplain to Edward VI., and one of the most popular preachers in the kingdom. When Mary came to the throne he was accused of sedition and tried before Gardiner, and was condemned, and burned at the stake at Smithfield, July 1, 1555. Many of his short works are found in the issues of tract societies. There is a complete edition, with a life by Rev. Aubrey Townsend (1848-53).

BRADFORD, WILLIAM (c.1590-1657). One of the leaders and the historian of the Massachusetts Pilgrims, and the second Governor of Plymouth Colony. He was born in Austerfield, Yorkshire, England; joined the Separatist Church of John Robinson (q.v.) at the age of 17, and, after an unsuccessful attempt to leave England in 1607 (for which he was for a time imprisoned), joined the Pilgrims in Holland, where he became a silk-dyer, and afterwards a merchant. He advocated the removal to America, and was one of the Pilgrims who in 1620 came over in the *Mayflower* and founded Plymouth Colony. In April, 1621, he was chosen Governor to succeed Carver, and by repeated reëlections continued to hold this position until his death, except for five years, when "by importunity he got off." During all this period the story of his life is inseparably connected with that of the Colony, and by his wisdom, his tact, and his great administrative ability, he did perhaps more than any other one man to make the experiment a success. In particular he quickly saw the pernicious effects of the communal system and in 1623 insisted that it be abolished. The second patent of Plymouth was issued (in 1629) to "William Bradford, his heirs, associates, and assigns." Bradford rendered an inestimable service to students of American history by preparing a careful *History of Plimouth Plantation* (from 1602 to 1647), upon which, directly or indirectly, all subsequent accounts of the Pilgrims have been based. This history, says Tyler (*History of American Literature*, i., 118), "is an orderly, lucid, and most instructive work; it contains many tokens of its author's appreciation of the nature and requirements of historical writing, and though so recently published in a perfect form, it must henceforward take its true place at the head of American historical literature" and win for its author "the dignity of being called 'the father of American history.'" The manuscript of this work was used by Morton in the preparation of his *New England's Memoriale* (1669); by Prince in the preparation of his *Chronological History of New England* (1736), and by Hutchinson in the preparation of his *History of Massachusetts Bay* (1767). It was stored for many years in the tower of the Old South Church, but disappeared during the Revolutionary War; was found in the Fulham Library, England, in 1855; and in 1898 was returned to the United States and deposited among the Massachusetts archives. The history was first published, with notes by Charles Deane, in 1856, and since then has been twice reprinted: in facsimile, with an introduction by John A. Doyle (London and Boston, 1896), and under the title, *Bradford's History of Plimouth Plantation from the original Manuscript, with a Report of Proceedings Incident to the Return of the Manuscript to Massachusetts* (Boston, 1898). In addition to the history, Bradford wrote *Some Observations of God's Merciful Dealings with Us in the Wilderness; A Word to Plymouth; A Word to New England;* and *Epitaphium Meum*—all of which were left in manuscript and have been published in the *Collections of the Massachusetts Historical Society. A Diary of Occurrences Covering the First Year of the Colony*, written in conjunction with Edward Winslow, was published in 1622 and was long known as *Mourt's Relation;* and *A Dialogue, or the Sum of a Conference Between Some Young Men Born in New England and Sundry Antient Men that Came Out of Holland and Old England* was published in 1648, and has been republished in Vol. II. of the *Old South Leaflets* (Boston). Most of Bradford's shorter writings may be found in Young's *Chronicles of the Pilgrims* (Boston, 1841). Consult: *The New England Genealogical Register* for 1850; Walker, *Ten New England Leaders* (New York, 1901); Tyler, *A History of American Literature, 1607-1765* (New York, 1898); and Justin Winsor, *Governor Bradford's Manuscript History and Its Transmission to Our Times* (Cambridge, 1881). For an interesting Life of Bradford, consult Cotton Mather, *Magnalia* (London, 1702).

BRADFORD, WILLIAM (1663-1752). An American printer. He was born in Leicester, England, and, with other Quakers, emigrated to America in 1682. In 1685 he established in

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Philadelphia the first printing-press in the Middle Colonies, and in 1690 he, with two others, built a paper-mill on the Schuylkill. In 1691 he was arrested and tried by the authorities for 'seditious libel,' and though the jury refused to convict, his press and publications were confiscated. He removed to New York in 1693 and in the same year established the first press in that Colony. On October 16, 1725, he began the first newspaper in New York City, and the fourth in America, *The New York Gazette*. For years he was the only printer in the Colony and for 50 years held the office of public printer. He had two sons, one of whom, Andrew Sowles Bradford (1686-1742), was a prosperous publisher in Philadelphia. Consult Wallace, *An Address at the Celebration by the New York Historical Society of the 200th Birthday of William Bradford* (Albany, 1863).

BRADFORD, WILLIAM (1827-92). An American marine painter; born of Quaker parents, at New Bedford, Mass. He was educated for business, but developed a talent for painting. Several voyages along the coast of New England and northward as far as Greenland furnished him with suggestions for some of his best pictures, among which are "Steamer *Panther* Among Icebergs and Field-Ice in Melville Bay, Under the Light of the Midnight Sun;" "A Stiff Breeze in the Harbor of Eastport;" "A Squall in the Bay of Fundy;" "The Coast of Labrador;" "Crushed by Icebergs;" "Arctic Wreckers;" and "Sunset in the North."

BRAD'FORD-ON-A'VON (AS. *Bradanford*, from *brād*, broad + *ford*, ford). A market-town in Wiltshire, England, on the Avon, and on the Kennet and Avon Canal, 6 miles east-southeast of Bath, and 29 miles northwest of Salisbury (Map: England, D 5). The Avon, which is crossed by two bridges, divides the town into the old and new. The small Church of Saint Lawrence is one of the few examples of Saxon architecture in England. It was founded by Saint Aldhelm in the Seventh Century. The town has been noted for many centuries for its manufacture of fine broadcloths. Kerseymeres were first made here. Population, in 1891, 4943; in 1901, 4514.

BRADLAUGH, brăd'lą, CHARLES (1833-91). An English radical politician and social reformer. He was born in London, September 26, 1833. His early education was meagre, for he had to support himself, at times by running errands. At the age of 17 he enlisted in the army. He secured his discharge in 1853, became clerk to a London solicitor, and soon was noted as an agitator, free-thought lecturer, and as a pamphleteer under the name of 'Iconoclast.' He published the *National Reformer*. In 1873 he made a short visit to the United States, lecturing in the larger cities. In 1876, with Mrs. Annie Besant, he was sentenced to six months' imprisonment and £200 fine for republishing the Malthusian *Fruits of Philosophy*, but the conviction was quashed on appeal. Elected member of Parliament for Northampton in 1880, he pleaded that as an atheist he had the right to affirm, but when this request was denied, expressed his willingness to take the oath. This the House decided he was disqualified from doing; he was ordered to leave, and on his refusal was placed in custody. His seat was declared vacant by the court to which the case was carried. But his constituency returned him in 1881; he presented himself, was again denied the privilege of taking the oath, and on his refusal to leave the House was forcibly ejected. Similar scenes occurred at the proroguing of Parliament in 1882 and 1883, and in the latter year Bradlaugh won a suit which he brought against the sergeant-at-arms for unlawful ejection. The case, however, was decided on technical grounds, and the invalidity of his title to a seat in the House was reaffirmed. In 1885 he was again returned for Northampton, and was permitted to take the oath, and shortly before his death, January 30, 1891, Parliament expunged from its records the resolution forbidding him to take the oaths. Of his writings, *The Impeachment of the House of Brunswick* (Boston, 1875) attained the greatest popularity. It advocated the repeal of the Hanoverian settlement of the crown at the Queen's death. See his life by his daughter, Mrs. Bonner, and J. M. Robertson (1894).

BRAD'LEY, EDWARD (*Cuthbert Bede*) (1827-89). An English author. He was born at Kidderminster; graduated in 1848 at Durham University; was consecrated a priest of the Established Church, and was rector of Denton, Stretton (1871-83), and Lenton. He contributed to periodicals, and wrote numerous volumes both of prose and verse, of which the best known is *The Adventures of Verdant Green* (1853-57), a humorous story of life at Oxford.

BRADLEY, GEORGE GRANVILLE (1821-89). An English clergyman. He was educated at Rugby and Oxford, served as assistant master at Rugby, became head-master of Marlborough College in 1858, and was ordained in the same year. He was honorary chaplain to the Queen from 1874 to 1876, and succeeded Dean Stanley as Dean of Westminster, in 1881. Among his publications are *Recollections of Arthur Penrhyn Stanley* (1882); *Lectures on Ecclesiastes* (1885); and *Lectures on Job* (1887).

BRADLEY, HENRY (1845—). An English scholar. He was born in Manchester, December 3, 1845; was educated at Chesterfield Grammar School; spent some time in teaching and was employed as clerk and foreign correspondent at Sheffield till 1884, when he went to London. Bradley has contributed to periodicals and encyclopædias, and edited or revised several philological works. In 1889 he became one of the editors of the great Oxford English Dictionary.

BRADLEY, JAMES (1693-1762). An English astronomer. He was born at Sherbourn in Gloucestershire and was educated at Oxford. Afterwards he studied with his uncle, the Rev. James Pound, who was at that time one of the best astronomers in England. In 1721 he was appointed to the Savilian chair of astronomy at Oxford University. In 1729, after repeated observations, he announced his important discovery of the aberration of light. The theory advanced by Bradley to explain this complex phenomenon has remained practically unchanged. (See ABERRATION.) In 1742 Bradley, who had been styled by Newton 'the best astronomer in Europe,' was appointed Astronomer Royal and entered upon a career of great activity at Greenwich. Several years afterwards he discovered nutation, or the inconstancy of the inclination of the earth's axis

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to the ecliptic. For this discovery he received the Copley Medal in 1748. In the same year he secured a new instrumental outfit for the Royal Observatory, by means of which the foundations of modern sidereal astronomy were laid. He left at his death thirteen manuscript volumes of observations, which were published in 1798-1805. His *Miscellaneous Works and Correspondence* was published in 1832.

BRADLEY, JOSEPH P. (1813-92). An American jurist; born at Berne, N. Y. He graduated at Rutgers in 1836; was admitted to the New Jersey bar in 1839; was retained as counsel to various railway corporations, and became prominent in several cases of importance. In 1870 he was appointed an associate justice of the United States Supreme Court and assigned to the Fifth Circuit (Gulf States, Georgia to Texas), from which he was subsequently transferred to the Third (Pennsylvania, New Jersey, and Delaware). He was a member of the Electoral Commission of 1877, which decided the election of 1876 in favor of Hayes, and supplemented his vote by an opinion noteworthy for logical clearness. A profound and discriminating student of the law, he was in particular distinguished for opinions on civil rights, habeas corpus, and admiralty cases, and in those involving constructions of the Federal Constitution. In 1870 he pronounced the centennial address at Rutgers College.

BRAD'SHAW, HENRY (?-1513). An English mediæval poet; born at Chester. He was enrolled there among the monks of Saint Werburgh's, and studied theology at Gloucester College, Oxford. He wrote *De Antiquitate et Magnificentia Urbis Cestriæ*, and a *Life of Saint Werburgh* (1500), in English verse.

BRADSHAW, JOHN (1602-59). An English Commonwealth judge, famous as one of the regicides. He was born near Stockport, Cheshire. He studied law and was called to the bar at Grey's Inn, 1627. He gained a good practice by his ability and learning, held several offices, and was elected president of the High Court of Justice for the trial of King Charles I. in 1649. As the reward of his services on that occasion, he was made president of the Council of State, and chancellor of the Duchy of Lancaster; he also received a grant of estates worth £2000 per annum. Bradshaw, however, frequently opposed the Protector when unable to see or comprehend the necessity for his rigid rule. After Cromwell's death he was lord president of the Council of State, and a commissioner of the Great Seal under Richard Cromwell. He was a friend of Milton, who eulogized him. He died in London, October 31, 1659. His body was buried with pomp in Westminster Abbey, but at the Restoration was exhumed and hung on a gibbet, with those of Cromwell and Ireton.

BRAD'STREET, ANNE (c.1612-72). An American poet. She was born at Northampton, England, about 1612. Mrs. Bradstreet was a daughter of Gov. Thomas Dudley. She married the future Governor Bradstreet in 1628, went with him to New England (1630), and in the intervals of household duties involved in the rearing of eight children became a voluminous author, who won for herself from her compatriots the admiring designation, 'The Tenth Muse.' Her poems were published under a title which gives a tabular view of their contents, to wit: *Several Poems Compiled with Great Variety of Wit and Learning, Full of Delight, Wherein Especially is Contained a Complete Discourse and Description of the Four Elements, Constitution, Ages of Men, Seasons of the Year, Together with an Exact Epitome of the Three First Monarchies, viz. The Assyrian, Persian, and Grecian, and the Beginning of the Roman Commonwealth, to the End of Their Last King; with Divers Other Pleasant and Serious Poems by a Gentlewoman of New England* (London, 1650). It is on the title-page of this edition that she is called 'The Tenth Muse.' The *Four Monarchies* (1867) is based on Sir Walter Raleigh's *History of the World;* but she drew her chief poetic inspiration from Sylvester's translation of the *Creation*, by Du Bartas, 1606 (q.v.). A second edition appeared at Boston in 1678, with additions, among which is *Contemplations*, her best poem. Her complete *Works*, which include certain memorials of her life and prose aphorisms, were edited by J. H. Ellis (1867) and for the Society of the Duodecimos (1897), with an introduction by Charles Eliot Norton. Mrs. Bradstreet's verses are in the main lacking in poetic power, and the modern reader wonders at the admiration they excited. Cotton Mather said they "would outlast the stateliest marble." Her contemporaries 'weltered in delight' or were 'sunk in a sea of bliss' at their perusal. They were at least the best of her generation in America. They show an indomitable assertion of a woman's right to thought and learning. She deserves an honored place in the history of New England culture, as one of the first writers in America devoted to literature for its own sake.

BRADSTREET, JOHN (1711-74). An English soldier, who spent nearly his whole life in service in North America. In 1745 he served in the Louisburg expedition as lieutenant-colonel in Pepperell's regiment, and later in the year was raised to the rank of captain. In 1746 he was appointed lieutenant-governor of Saint John's, and in 1755 became adjutant-general under General Shirley (q.v.). He took part in the attack on Ticonderoga in 1758, and immediately thereafter became quartermaster, with the rank of colonel. On August 27 of this year he captured Fort Frontenac, and in 1759 accompanied General Amherst on his expedition against Ticonderoga and Crown Point. He commanded an expedition against the Indians during the Conspiracy of Pontiac, and on September 7, 1764, made a treaty with them at Detroit. In 1792 he became a major-general.

BRADSTREET, SIMON (1603-97). An early Colonial Governor of Massachusetts, born in Horbling, Lincolnshire, England. He was educated at Cambridge, and in 1630 emigrated to America and settled at Cambridge, Mass. He was an assistant judge, and was successively secretary, agent, and commissioner of the United Colonies. In 1662 he was sent to congratulate Charles II. on his restoration. He was assistant governor from 1630 to 1679; was deputy governor from 1673 to 1679; and was Governor from 1679 to 1686, when the Massachusetts charter was revoked. He was restored to office in 1689 and remained in power until the new charter arrived in 1692, when he was made first councilor. He was generally popular as a magistrate,

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though in several instances, notably with regard to the witchcraft delusion of 1692, he was opposed to the majority of the colonists. His wife was Anne Bradstreet, the poet, daughter of Thomas Dudley (q.v.).

BRADWARDINE, brăd'wēr-dĭn, BARON. A pedantic but genial old soldier, of ancient lineage, in Scott's novel *Waverley*. He is the master of Tully Veolan, and his daughter, called the 'Rose of Tully Veolan,' saves Waverley's life, and, later, marries him.

BRADWARDINE, or **BREDWARDINE,** THOMAS, was born at Hartfield, in Sussex, England, near the close of the Thirteenth Century, and died at Lambeth, 1349. He early acquired the reputation of being a profound scholar, skillful mathematician, and able divine, which won him the title, 'Profound Doctor.' He was chancellor of the university, later became confessor to Edward III., and finally was consecrated Archbishop of Canterbury, but died of plague shortly after his consecration. Part of Bradwardine's mathematical work was on the subject of star-polygons, a subject which fascinated the great Kepler, Regiomontanus, and Cardan, and which has attracted much attention in recent times. The trigonometry of the Arabs was known to him, and his philosophic works contain discussions of the infinite and the infinitesimal, which have played so important a part in modern mathematics. His chief works are: *De Causa Dei* (1618); *De Geometria Speculativa* (1495, 1512, 1530); *De Proportionibus* (Paris, 1495); *De Quadratura Circuli* (1495), and *De Arithmetica Practica* (1502).

BRA'DY, A. See BARDOUX, AGÉNOR.

BRADY, CYRUS TOWNSEND (1861—). An American clergyman and author; born in Allegheny, Pa. He graduated in 1883 at the United States Naval Academy, and after work in connection with Western railways was in 1890 ordained priest of the Protestant Episcopal Church. He was rector of churches in Missouri and Colorado, and subsequently was appointed Archdeacon of Kansas. From 1895 to 1899 he was Archdeacon of Pennsylvania, and in the latter year became rector of Saint Paul's Church, Overbrook, Philadelphia, Pa. During the Spanish-American War he was chaplain of the First Pennsylvania Volunteers. He has published lives of *Stephen Decatur* (1900) and *Commodore Paul Jones* (1900); *Recollections of a Missionary in the Great West* (1900), his best work, and several volumes of fiction.

BRADY, GEORGE STEWARDSON (1832—). An English zoölogist and paleontologist. He was born at Gateshead-on-Tyne and was educated at the University of Durham. He practiced medicine and surgery in Sunderland from 1857 to 1872, and became president of the Sunderland Subscription Library and Literary Society, and of the Sunderland Microscopical Society. His principal published works are: "A monograph of the Recent British Ostrocada," in *Transactions of the Linnæan Society* (1868); *A Monograph of the Post-Tertiary Entomostraca of Scotland* (1874); *A Monograph of the Free and Semi-Parasitic Copepoda of the British Islands* (1877-80).

BRADY, HENRY BOWMAN (1835-90). An English paleontologist, born at Gateshead. He was a successful manufacturing pharmacist and had much influence in placing that profession on a sound scientific basis. For several years he was member of the council of the Pharmaceutical Society. The associations of his youth had developed in him a desire for research in natural history, and his life near the coast of the North Sea enabled him to gratify his tastes in that direction. He spent much time in dredging marine animals, and became particularly interested in a group of minute organisms, the foraminifera, concerning which he eventually was recognized as the chief English authority. He studied also the fossil members of this group of animals. The oceanic deposits collected by the *Challenger* expedition were turned over to him for examination, and the contained foraminifera furnished the material for an extensive monograph, perhaps the most important ever published on that class of animals. He published several memoirs on the foraminifera of the Mesozoic, Cenozoic, and recent deposits of Great Britain, and contributed freely to the scientific journals. He was elected a fellow of the Geological Society of London in 1864, of the Royal Society in 1874, and was also a fellow of the Linnæan and the Zoölogical societies. His more important works are: *Report on the Foraminifera Dredged by H.M.S. Challenger, During the Years 1873-76; Scientific Results of the Challenger Voyage*, Vol. IX. (1888), a magnificent work of over 800 quarto pages, with an atlas of 115 plates; "A Monograph of Carboniferous and Permian Foraminifera," *Transactions Paleontographical Society*, Vol. XXX. (1876).

BRADY, JAMES TOPHAM (1815-69). An American lawyer; born in New York City. He was educated by his father, who was also a lawyer and a judge. The son became eminent for eloquence and met with remarkable success as a lawyer, especially in criminal cases. In 1843 he was appointed district attorney, and in 1845 corporation attorney. In 1860 he was the candidate of the pro-slavery Democrats for Governor. He contributed largely to newspapers and magazines, but left no collected works.

BRADY, JOHN (1840—). An Irish-American prelate; born in County Cavan, Ireland. He studied at All Hallows College, was ordained priest in 1864, and from 1864 to 1868 was assistant pastor at Newburyport, Mass. In 1868 he became pastor at Amesbury, Mass. He greatly aided Archbishop Williams, of Boston, in the labors of that episcopate, and was appointed Auxiliary Bishop of Boston in 1891. In the same year he was consecrated titular Bishop of Alabama.

BRADY, WILLIAM MAZIERE (1825—). An English Roman Catholic divine and author; born in Dublin, Ireland, of a distinguished family. He graduated from Trinity College and became a leader in the movement to disestablish the State Church of Ireland, of which he was a clergyman. His attacks on the establishment led to the loss of many of his preferments, and in 1873 he became a Roman Catholic. His publications include: *The Episcopal Succession in England, Ireland, and Scotland, 1400-1875* (1876-77); *Annals of the Catholic Hierarchy in England and Scotland* (1883); and *Anglo-Roman Papers* (1890).

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BRAEKELEER, brä'ke-lär, FERDINANDUS DE (1792-1883). A Belgian artist; born in Antwerp. He was a pupil of the Antwerp Academy and of Van Bree; studied for three years in Italy, and became a member of the Antwerp Academy and director of the Antwerp Museum. His earlier paintings were chiefly historical, and for the most part large in size; afterwards he dealt mainly with genre subjects. His success as an instructor was marked. A list of his works includes: "Tobit Burying a Jew by Night" (1817); "The Grotto of Neptune at Tivoli" (1822); "The Baker;" "Rubens Painting the Chapeau de Paille;" "Bombardment of Antwerp in 1830;" "The Defense of Antwerp in 1576 Against the Spaniards;" "The Round of the Market;" "The Grandfather's Holiday Visit;" "Happy Family;" and "Unhappy Family."

BRAG (from *brag*, to boast; cf. the game *bluff*). A game at cards. The whole pack is used, and the cards rank as at whist, except the nines and knaves, which are called 'braggers,' and rank the same as any cards with which they may be held. An ace and a nine and a knave are called three aces, and a deuce and the two brag cards make three deuces, etc. The highest hand is a pair royal, three of a kind, ace being highest; next best, highest pair, and last, the single card. There is no playing; the hands are merely shown, and the highest wins the stake.

BRAG, Sir JACK. A suggestive name bestowed on Gen. John Burgoyne (q.v.).

BRAGA, brä'gà (Lat. *Bracara*, so called from the tribe *Bracares*). The capital of a district in the Portuguese Province of Minho and seat of an archbishop, 33 miles west-northwest of Oporto (Map: Portugal, A 2). It is an old town, surrounded by walls and towers and containing a number of old buildings. The cathedral, originally built in the Twelfth Century and altered since then, contains a number of relics relating to the early history of Portugal, but is of little architectural value. There is also an archiepiscopal palace, with a fine library and a number of smaller churches and monasteries. In the vicinity is situated the Church of Bom Jesus do Monte, visited annually by thousands of pilgrims. Braga is of some industrial importance, producing hats, arms, textiles, and gold and silver articles. Population, in 1890, 23,089; in 1900, 24,309. Braga was the capital of Lusitania and the seat of a council in 530, at which the Suevi renounced Arianism.

BRAGA, THEOPHILO (1843—). A Portuguese philologist, poet, and literary historian, born on the island of San Miguel, Azores. He studied at the University of Coimbra, and in 1872 was appointed professor of modern languages in the Curso Superior de Letras of Lisbon. He is one of the most important of modern Portuguese writers, known in his own country chiefly through his presentation of the positivism of Comte, and his militant democracy in politics. Beyond Portugal he is best known for his investigation regarding the philology and literature of the Spanish Peninsula. His work in that field has been far too extensive wholly to escape a certain carelessness, yet his contributions to a critical knowledge of the subject have been noteworthy. From 1880 to 1886 he edited the periodical *O Positivismo*. A much-abridged list of his works includes *Historia da poesia popular portugueza* (1867); *Theoria da historia da litteratura portugueza* (1872); *Manual da historia da litteratura portugueza* (1875); *Traços geraes de philosophia positiva* (1877); *Soluções positivas da politica portugueza* (1879); an excellent life of Camoëns (1880); and a selection of poems, entitled *Alma Portugueza* (1893).

BRAGANÇA, brä-gän'sä. The name of two considerable towns in Brazil. (1) A seaport in the State of Pará, at the mouth of the Caite, which enters the Atlantic about 100 miles to the east of the Rio Pará estuary (Map: Brazil, H 4). It is 110 miles northeast of Pará, with which it is connected by a railroad. Population, 6000. (2) An inland city of about 10,000 inhabitants, in the State of São Paulo, 70 miles north of Santos, with which it is connected by rail, and about 200 miles to the west of Rio de Janeiro.

BRAGANÇA. A city of Portugal, capital of a district in the Province of Traz-os-Montes, situated in a pleasant and fertile district, on the Fervença, an affluent of the Sabor (Map: Portugal, B 2). It is surrounded with walls, and was the ancestral seat of the Dukes of Bragança (Braganza). There are some manufactures of silk and velvet. Population, in 1890, 5840; in 1900, 5476. See BRAGANZA, HOUSE OF.

BRAGANZA, brä-gän'zä, HOUSE OF. The reigning house of Portugal, originally Dukes of Braganza (see BRAGANÇA). The first Duke was a bastard son of King John I. In 1640, Portugal, which had been ruled by Spain for 60 years, achieved its independence under Dom John, Duke of Braganza, who was made King, with the title of John IV.

BRAGELONNE, brázh'lŭn', LE VICOMTE DE, OU DIX ANS APRÈS. The title of a novel by the elder Dumas (1848), the last of the trilogy of which *Les trois mousquetaires* was the first.

BRAGG, BRAXTON (1817-76). An eminent Confederate general in the American Civil War. He was born in Warren County, N. C.; graduated at West Point in 1837, and served in the Seminole War in 1837-39, and again in 1841-42. During the Mexican War he served under General Taylor, and for "gallant and distinguished conduct" at Fort Brown, Monterey, and Buena Vista was brevetted captain, major, and lieutenant-colonel, respectively. He was on duty in various garrisons until January, 1859, when he left the service to become a sugar-planter in Louisiana. From 1859 to 1861 he was commissioner of the Louisiana Board of Public Works. He joined the Confederate Army on the outbreak of the Civil War, was made brigadier-general early in 1861, and soon afterwards was placed in command at Pensacola, Fla., of the Confederate forces which operated against Fort Pickens. He was promoted to be major-general in February, 1862; joined the Army of the Mississippi; took a conspicuous part in the battle of Shiloh (April 6-7); and, after the death of A. S. Johnston, was raised to the rank of general. On June 20, 1862, after the evacuation of Corinth, he replaced General Beauregard as commander of the Western Department, and in August, at the head of a force of 45,000, invaded Kentucky, with the intention of winning over that State to the Confederate cause. An exciting race for Louisville ensued between him and Buell, but Buell arrived first and by skillful manœuvring gradually forced

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him to retreat. The two armies met at Perryville, Ky., on October 8, and Bragg, defeated, withdrew hastily into Tennessee. His apparent failure in this campaign brought upon him the bitter criticism of the South, and for a time his removal was seriously contemplated; but his campaign, according to General T. A. Dodge, "had really placed him in a position in Buell's front far superior to the one he had occupied before he marched for the Ohio, morally and materially." At Murfreesboro, or Stone River, on December 31, 1862, and January 2, 1863, he was again worsted by the Federal Army, now under Rosecrans, and fell back upon Chattanooga. Out of this city, early in September, 1863, he was skillfully manœuvred by Rosecrans, whom, however, he defeated decisively in the great battle of Chickamauga (September 19-20). Soon afterwards he was utterly defeated, in turn, by Grant in the three days' battle of Chattanooga (November 23-25), and, in deference to the growing dissatisfaction of his army, he was replaced by Hardee on December 2. On February 24, 1864, he was summoned to Richmond, where, under the direction of President Davis, he was charged with "the conduct of military operations in the armies of the Confederacy." He was placed in command of the Department of North Carolina in November, and led an unsuccessful expedition into Georgia to coöperate against Sherman, then on his march to the sea. In February, 1865, he was assigned to active service under J. E. Johnston, and remained with that officer until his surrender. After the war Bragg was for some time chief engineer for the State of Alabama, and as such had charge of the improvements in Mobile Bay. He was a hard fighter, and as an officer was brave and resourceful; but he was also a stern martinet, was sometimes dilatory in his movements, and was frequently lax in supervising the execution of his orders.

BRAGG, Edward Stuyvesant (1827—). An American politician, born at Unadilla, N. Y., and educated at Geneva College. He was admitted to the New York bar in 1848, but removed to Wisconsin, and was admitted to the bar of that State in 1850. From 1854 to 1856 he was district attorney for Fond du Lac County, Wis. He entered the army as a captain in 1861, and was mustered out as a brigadier-general in 1865. He was in Congress from 1877 to 1885, and in 1884 seconded the nomination of Cleveland, making use of the famous expression, "We love him for the enemies he has made." In 1902 he was appointed Consul-General to the Cuban Republic.

BRAGGADOCCHIO, brăg'gȧ-dō'chō (evidently from bragging). A character in Spenser's *Faerie Queene*, representing the twin vices of boasting and cowardice, and drawn from Ariosto's Martano in *Orlando Furioso*.

BRAGI, brä'gē, or Brage. In Scandinavian mythology, the god of poetry and eloquence, son of Odin and Frigga. According to the Older Edda he was the most perfect of all skalds, or poets, and the inventor of poetry, which is designated by a kindred word, *bragr*. One of the books of the Younger Edda is called *Bragi's Talk*. Unlike Apollo, who, in the Greek mythology, is represented as enjoying eternal youth, Bragi was supposed to be an old man with a long, flowing beard, but his brow was always mild and unwrinkled. Bragi's wife was Idun (q.v.). Together with Hermod he received and welcomed all those heroes who had fallen in battle on their arrival at Valhalla. On festive occasions, as well as at the burial of a king or earl, a goblet, called Bragafull (Bragi's goblet), was presented, before which each man arose, made a solemn vow, and emptied it. The Danish King Sweyn is said to have made such a vow before the invasion of England in 994. The myth of Bragi was probably developed from the earliest known Norse skald of the same name, who lived c.800, and of whose fragmentary works there is an edition by Gering (Halle, 1886). Several German periodicals and other works, intended to cherish a national spirit, have taken the name of Bragi.

BRAGMAR'DO. The name of a character in *Gargantua and Pantagruel*, by Rabelais.

BRAHAM, brä'am, John (1774-1856). A well-known English singer, of Jewish descent, born in London. He had an unusually long professional career, having begun to sing on the stage at the age of ten. About the close of the Eighteenth Century he visited France and Italy for improvement. On his return to England he became remarkably popular, and from that time, for half a century, he was considered the greatest tenor in Europe. Sir Walter Scott considered him "a beast of an actor, but an angel of a singer." His real forte was the concert stage, where he was most effective in patriotic numbers.

BRAHE, brä *or* brä'ȧ, Tycho (1546-1601). A celebrated Danish astronomer, born at Knutstorp. He was descended from a noble family, originally Swedish, and was sent, at the age of thirteen, to the University of Copenhagen, where he had not been more than a year when an eclipse of the sun turned his attention to astronomy. His uncle, who destined him for the law, furnished him with a tutor, and sent him to Leipzig in 1562; but Brahe, who cared nothing for that study, devoted just so much time to it as would save appearances, and while his tutor slept busied himself nightly with the stars. By these surreptitious observations of the heavens, and with no other mechanical contrivances than a globe about the size of an orange and a pair of rude compasses, he succeeded, as early as 1563, in detecting grave errors in the tables of Copernicus, and set about correcting them. The death of his uncle, who left him an estate, recalled him to his native place in 1565, but he very soon became disgusted with the ignorance and arrogance of those moving in the same sphere with himself, and went back to Germany. At Wittenberg, where he resided for a short time, he lost part of his nose in a duel with a Danish gentleman; but for the lost organ he ingeniously contrived one of gold, that fitted so admirably, and was so naturally colored, that few could have detected that it was artificial. After a couple of years spent in Augsburg he returned home, where, in 1572, he discovered a new and brilliant star in the constellation Cassiopeia. In 1573 he married a peasant girl, which his fellow-noblemen thought even more undignified than being addicted to astronomy; for this they considered very degrading to a gentleman, whose only becoming qualification should be, in their estimation, skill in the use of arms. After some time spent in travel, Brahe received from his sovereign, Frederick II., the offer of the island of

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Hven as the site for an observatory, the King also offering to defray the cost of erection, and of the necessary astronomical instruments, as well as to provide him with a suitable salary. Brahe accepted the generous proposal, and in 1576 the foundation-stone of the castle of Uraniborg ('fortress of the heavens') was laid. Here, for a period of twenty years, Brahe prosecuted his observations with the most unwearied industry—with a zeal, in fact, sufficient to create a new epoch in astronomy as a science of observation. The scientific greatness of Brahe was no protection against the petty prejudices of the nobles, who could not bear to see honor heaped on one who, according to their notions, had disgraced their order, nor against the meaner jealousies of physicians, who were annoyed at his dispensing medicine gratis to the poor. So long as his munificent patron, Frederick II., lived, Brahe's position was all that he could have desired, but on his death, in 1588, it was greatly changed. For some years under Christian IV., Brahe was simply tolerated; but in 1597 his position had grown so unbearable that he left the country altogether, having been the year before deprived of his observatory and emoluments. After residing a short time at Rostock and at Wandsbeck, near Hamburg, he accepted an invitation of the Emperor Rudolph II.—who conferred on him a pension of 3000 ducats—to Benack, a few miles from Prague, where a new Uraniborg was to have been erected for him; but he died at Prague on October 13, 1601. At Benack he had Kepler as his assistant, and to the advice of Brahe that celebrated astronomer owed much. The scientific publications of Brahe are numerous. Consult Dreyer, *Picture of Scientific Life and Work of Tycho Brahe* (London, 1890).

BRAHMA, brä'mȧ. According to its commonest usage, the name of the Supreme Being, or Creator of the Universe, in the Hindu religion and philosophy. The Sanskrit word *brahman* itself has three distinct phases, which are important to note: (1) *bráhman*, neuter and accented on the first syllable, with nominative singular *bráhmȧ*, signifies exaltation, force, especially the power of prayer, devotion, worship; and later, holiness, spirit, the all-pervading essence of the universe; (2) *brahmán*, masculine and accented on the ultima, with nominative singular *brahmȧ*, denotes a personification of the latter, the Supreme Creator of the Universe; (3) *brahmán*, also masculine and similarly accented, denotes a priest, a Brahman. The first two meanings alone are considered here; for the third see BRAHMANISM; and CASTE.

In the Rigveda *bráhmȧ*, neuter, signifies only the power of prayer; in the later development of the Brahmanas and Upanishads (q.v.) it denotes the essence of the universe from which all created things are evolved, and into which they are reabsorbed. The personified god *Brahmȧ*, masculine, is a deified form of this absolute spirit, and to know him is the step toward the higher knowledge of the impersonal and supreme soul. Brahma as a divine being represents creative activity, and he shares respectively with the other two members of the Hindu Trinity, Vishnu and Siva, in producing, maintaining, and dissolving the world. As a formal triad this union is of later origin in the development of Hindu mythology. The attribute of creative activity is ascribed to various gods in the older Vedic period; but in the stage of the Brahmanas, the father-god, Prajāpati, or Brahmȧ, appears as the individual creator. In Manu, i. 1, seq. (q.v.), Brahmȧ is described as self-existent and as evolving the world from an egg—the doctrine of the cosmic egg—and his existence endures for an æon that is practically eternal. The representations of Brahmȧ in Hindu mythology often show him as born in a lotus sprung from the navel of Vishnu. Five heads were originally assigned to him, but one was destroyed by Siva. His color is red and he rides upon a swan. The goddess Sarasvatī, or eloquence personified, is his consort. In the practice of the Hindu religion today Brahmȧ plays almost no part. Vishnu and Siva have supplanted this too abstract god. But in the reform spiritual movement of the Brahma Samāj (q.v.), God is worshiped under the form of the ideal and supreme Brahmȧ, which comprises the three manifestations of Brahmȧ, Vishnu, and Siva. Consult H. W. Griswold, *Brahman* (New York, 1901, Macmillan). See INDIA; TRIMURTI; SIVA; VISHNU.

BRAHMAGUPTA, brä'mȧ-gōōp'tȧ (born in 598). One of the most prominent Hindu mathematicians and astronomers. He wrote (628) the *Brahma-sphuta-siddhanta* (the Improved System of Brahma), of which chapters xii. and xviii. are on mathematics. Two other works by him are known, at least by title. Brahmagupta's mathematical chapters have been translated into English by Colebrooke (London, 1817).

BRAHMANA (bräh'mȧ-nȧ) THE. Second of the three grand divisions of Vedic literature, consisting of writings relating to prayer (*bráhman*) and sacrifice. These works, belonging to a much later period than the hymns, when the language had become obscure, represent the views of various teachers in regard to the interpretation of the text, the ritual, dogma, and the relation of the hymns to the sacrifice. In addition, a mass of legends, mythology, and speculations on philosophy and etymology produce a strange conglomerate, containing much that is absurd, but also much of value for the study of language and civilization. Attached to the Brahmana are two other classes of writings: the *Atanyakas*, containing instructions for the performance of the sacrifice by wood-dwellers, and the *Upanishads*. Of the preserved Brahmana, the most important are the *Aitareya Brahmana*, attached to the Rigveda; the *Chandogya*, Brahmana with the *Chandogya Upanishad*, belonging to the *Samaveda;* and the *Catapatha Brahmana*, belonging to the *White Yajurveda*.

BRAHMANASPATI, brä'mȧ-näs'pȧ-tē. See BRIHASPATI.

BRAHMANISM, brä'man-iz'm. As a religious term, Brahmanism is a comprehensive name usually employed to specify the system of religious institutions originated and elaborated by the Brahmans, who are and have been from an early period the sacerdotal and dominant caste among the Hindus. The earliest phases of religious thought in India of which a clear notion can now be formed are exhibited in a body of writings which long ago came to be regarded as sacred, known under the collective name of *Veda*, 'knowledge,' or *Śruti*, 'revelation.' The Hindu scriptures consist of four separate collections of sacred

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texts, including hymns, incantations, and sacrificial forms of prayer. They are: (1) the *Rigveda;* (2) the *Sāman*, or *Sāmaveda;* (3) the *Yajush*, or *Yajurveda;* (4) the *Atharvan*, or *Atharvaveda*. Each of these four text-books has attached to it a body of prose writings called *Brāhmaṇas*, which explain the ceremonial application of the texts, and the origin and import of the sacrificial rites for which they were supposed to have been composed. These are complemented by the shorter *Sūtras*, manuals of various sorts, liturgical and ritual. All these to the Hindu are comprehended in the term Veda, the hymns alone being the (veda-) Sanhitā, or collection. The Atharvaveda was the last to be recognized as a real *veda*. The *Sāmaveda* and the *Yajurveda* are employed for purely ritual purposes, and as they are composed almost entirely of verses taken from the *Rigveda*, they are of secondary importance. The hymns of the *Rigveda* are the earliest poetical productions of the Aryan settlers in India which have come down to us. They all are old, though of varying periods, the earliest dating probably from B.C. 1200 to 1500. The last book has the characteristics of a later appendage. Of the *Atharvan* about a sixth is found in the Rigveda.

The religious thought of the old poets, as reflected in the hymns, is that of a worship of the grand and striking phenomena of nature viewed as personal and conscious beings, endowed with powers beyond the control of man, yet sensible to his praises and actions. It was more nearly a nature-worship than that of any other known form of polytheistic belief; a mythology comparatively little affected by those systematizing tendencies which, in other lands, led to the construction of a well-ordered pantheon and a regular organization of divine government. From the name, 'the Shining Ones,' given to these impersonations, it must be concluded that the more prominent objects of early adoration were the phenomena of light. In the primitive worship of the manifold phenomena of nature, their physical aspect impresses not only the human heart, but also the moral and intellectual forces which are supposed to move and animate them. The attributes and relations of some of the Vedic deities, in accordance with the nature of the objects which they represent, partake in a high degree of this spiritual element; but such deities are exceptional, and most of the Vedic gods have a thoroughly sensuous and anthropomorphic character. This latter element is especially predominant in the attributes and imagery applied by the Vedic poets to Indra, the god of the atmospheric region, and the favorite figure in their pantheon. While the representatives of the prominent departments of nature appear to the Vedic poet as independent of each other, their relations to the mortal worshiper being the chief subject of his anxiety, a simple method of classification was resorted to at an early time. It consisted of a triple division of the deities into gods residing in the sky, in the air, and on the earth. It is not until a later stage, however, that this attempt at a polytheistic system is followed up by the promotion of one particular god to the dignity of chief guardian for each one of these three regions. On the other hand, a tendency is clearly traceable in some of the hymns toward identifying gods whose functions present a certain degree of similarity of nature. These attempts seem to show a certain advance from polytheism toward a comprehension of the unity of the divine essence.

There was another feature of the old Vedic worship which tended to a similar result. The great problems of the origin and existence of man and the universe had early begun to engage the Hindu mind; and in celebrating the praises of the gods the poet was frequently led to attribute to them cosmical functions of the very highest order. At a later stage of thought the conception of maker of the universe was gradually restricted to one 'all-maker' or 'lord of all creatures,' attributes which eventually became designations of a new and supreme god. Still later, with the vaguer lines of demarcation between the old gods, came the thought that all these gods were essentially one, but that this one was not a god, but the divine spirit which animated all beings. Thus a pantheistic conception was arrived at, and put forth under such names as *Purusha*, 'soul,' *Kāma*, 'desire,' *Brahman* (neuter nom. sing., *brahma*), 'devotion, prayer.' Metaphysical and philosophical speculations were thus fast undermining the simple belief in the old gods, until, at the time of the composition of the *Brāhmaṇas* and the *Upanishads*, we find them in complete possession of the minds of the theologians. While the theories crudely suggested in the later hymns are now further matured and elaborated, the tendency toward catholicity of formula favors the combination of the conflicting monotheistic and pantheistic conceptions; this compromise, which makes *Prajāpati*, 'lord of all creatures,' and personal creator of the world, the manifestation of the impersonal *Brahma*, the universal self-existent soul, leads to the composite pantheistic system which forms the characteristic dogma of the Brahmanical period. The theories of creation set forth in the *Rigveda* show a multifarious belief, and philosophically the dogma is taught that 'being comes from non-being' (a tenet denied in a later age), so that it is impossible to derive completed Brahmanism from earlier thought, though all orthodox Brahmanism pretends to be based on 'Vedic truth.' Another striking difference between the Vedic and completed Brahmanic beliefs rests on the development of the philosophical conceptions outlined above. The Vedic poet believed in a joyful heaven, to which he was to go hereafter; the later Brahman desired not heavenly bliss, but an unconscious existence as part of the All-soul.

The division into *castes* (more properly classes) in India is well known. The hymn to Purusha names them as (1) the Brahmanas; (2) the Kshatriyas; (3) the Vaisyas, and (4) the Sudras. It was not until late in the history of India that castes in the modern sense of the word arose. At first these divisions were merely natural social classes of priests, soldiers, agriculturists, and slaves. As late as the Sixth Century B.C. rich merchants, as well as kings, stood on a social equality with priests. Intermarriage and eating together (the signs of caste) were not forbidden. But the priestly system eventually left absolute power in the hands of the Brahmans, or priests. They elaborated a system of laws, in which they made no scruple to fortify and protect themselves. The very lowest class was of no importance; but the other three, however unequal to each other in privileges and social standing, were united by a common bond of sacramental rites, traditionally connected from

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ancient times with certain stages and incidents in the life of the Aryan Hindu, such as the rites connected with conception, birth, name-giving, the first taking out of a child to see the sun, the first feeding with boiled rice, the rites of tonsure, the youth's investiture with the sacrificial thread, and his return home on completing his studies, with the ceremonies of marriages, funerals, etc.

The most important of these family observances was the rite of conducting the boy to a spiritual teacher, with which is connected the investiture with the sacred cord, ordinarily worn over the left shoulder and under the right arm, and varying in material according to the class of the wearer. This ceremony is supposed to constitute the second or spiritual birth of the Arya, and is the preliminary act to the youth's initiation into the study of the Veda, the management of the consecrated fire, and the knowledge of the rites of purification, including the solemn invocation to *Savitar* (the sun), which has to be repeated every morning and evening before the rising and setting of that luminary. It is from their participation in this rite that the three upper classes are called the 'twice born.' The ceremony is enjoined to take place some time between the eighth and sixteenth year in case of a Brahman; for a Kshatriya between the eleventh and twenty-second; and for a Vaisya between the twelfth and twenty-fourth. He who has not been invested with the mark of his class within the prescribed time is forever excluded from uttering the prayer to the sun, and becomes an outcast, unless absolved from his sin by a council of Brahmans, when, after due purification, he resumes the badge of his caste. With one who is not duly initiated no righteous man is allowed to associate or to enter into connections of affinity. The duty of the Sudra (the lowest caste) is to serve the twice-born classes, particularly the Brahmans. One of this caste is excluded from all sacred knowledge, and if he perform sacrificial ceremonies he must do so without using holy utensils.

It is expressly charged that no Brahman may recite a holy text where a man of the servile caste might overhear him, nor may he teach them the laws of expiating sin. The occupations of the Vaisya are connected with trade, agriculture, and the raising of cattle, while those of the Kshatriya consist in ruling and defending the people, administering justice, etc. Both these castes share with the Brahman the privilege of reading the Veda, but only so far as it is taught and explained to them by their spiritual preceptors. To the Brahman belongs the right of teaching and expounding the sacred texts, and also that of interpreting and determining the laws and rules of caste. Yet, in spite of those formidable barriers between the several orders, the practice of intermarrying appears to have been too prevalent in early times to have admitted of suppression. To marry a woman of a higher caste, and especially of a caste not immediately above one's own, is positively prohibited, the offspring of such a union being excluded from performing obsequies to his ancestors, and incapable of inheriting the parent's property. But, according to Manu, a man may marry a girl of any or each of the castes below his own, provided he has already a wife of his own class, since she only should perform the duties of personal attendance and religious observance devolving upon a married woman. Probably geographical differences must be taken into account in considering how far the Brahman's code obtained in fact as well as in theory. It was strongest in the Doab and about (modern) Delhi, weaker in the east, about Benares, and in the south probably had little hold upon the people, till religious persecutions drove the Brahmans southward in large numbers.

The devoted Brahman who desired to obtain the utmost good upon the dissolution of his body was enjoined to pass successively through four orders or stages of life, viz.: (1) That of religious student; (2) that of householder; (3) that of anchorite; (4) that of religious mendicant. Theoretically, this course was open and recommended to every twice-born man, his distinctive occupations being in that case restricted to the second condition, or that of married life. Practically, however, persons of the second and third castes were doubtless, in general, content to go through a term of studentship in order to obtain a certain amount of religious instruction before entering into the married state and performing their professional duties.

It is true that in the case of the sacerdotal class the practice was probably all but universal in early times; but gradually a more and more limited proportion seem to have carried their religious zeal to the length of self-mortification involved in the two final stages. When the youth had been invested with the sign of his caste, he was to reside for some time in the house of some religious teacher, well read in the Veda, to be instructed in the knowledge of the scriptures and the scientific treatises attached to them, in the social duties of his caste, and in the complicated system of purificatory and sacrificial rites. According to the number of Vedas he intended to study, the duration of the period of instruction was said to be—probably in the case of Brahmanical students chiefly—from twelve to forty-eight years, during which time the virtues of modesty, duty, temperance, and self-control were to be firmly implanted in his mind by unremitting observance of the most minute rules of conduct. Probably twelve years was the usual limit of a student's life, during which time he had to subsist entirely on food obtained by begging from house to house; and his behavior toward the preceptor and his family was to be that prompted by respectful attachment and implicit obedience. In the case of girls no investiture takes place, the nuptial ceremony being considered an equivalent for that rite. On quitting the teacher's abode, the young man returns to his family and takes a wife. To die without leaving legitimate offspring, and especially a son to perform the periodical rite of obsequies to his father, is considered by the true Hindu a very great misfortune. There are three sacred debts which a man has to discharge in life: that which is due to the gods, of which he acquits himself by daily worship and sacrificial rites; that due to the ancient and inspired seers of the Vedic texts, discharged by the daily study of the scriptures; and the final debt which he owes to his *manes*, and of which he relieves himself by leaving a son. Some authorities add a fourth—the debt owing to human kind, which demands the practice of kindness and hospitality; hence the necessity of entering into the married state. When the husband leads the

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bride from her home to his own, the fire which has been used for the marriage ceremony goes with the new couple, to serve as their domestic fire; and it has to be kept up perpetually day and night, by either themselves or their children, or, if the man be a teacher, by his pupils. If it should become extinguished by neglect or otherwise, the guilt thereby incurred must be atoned for by an act of expiation. The domestic fire serves the family for preparing their food, for making the fire necessary daily for occasional offerings, and for performing sacramental rites. No food should be eaten that has not been duly consecrated by a portion of it being offered to the gods, the goblins, and the *manes*. The domestic observances, many of which must be considered as ancient Aryan family customs, surrounded by the Hindus with a certain amount of adventitious ceremonial, were generally performed by the householder himself, with the assistance of his wife.

There is, however, another class of sacrificial ceremonies of a more pretentious and expensive kind, called *Śrauta* rites, or rites based on revelation, the performance of which, though not indispensable, was yet considered obligatory under certain circumstances. They formed a powerful weapon in the hands of the priesthood, and were one of the chief sources of their subsistence. Owing to the complicated nature of these sacrifices, and the great amount of ritualistic formulas and texts recited during their performance, they required the employment of a member of professional Brahmans, frequently as many as sixteen, who had to be well rewarded for their services. Priests who refuse money for their services are eulogized by Brahmanical writers, but such virtue was rare. The manuals of the Vedic rituals generally enumerated three of these rites: *ishtis*, or oblations of milk, curds, clarified butter, rice, grain; seasonal and annual offerings; and libations of *soma*. The *soma*, which is an intoxicating drink prepared from the juice of a kind of milkweed, sometimes called the moonplant, must have played an important part in the ancient worship, at least as early as the Indo-Persian period. It is continually alluded to both in the *Avesta* and the *Rigveda*. In the latter work the hymns of a whole book are addressed to it, either in the shape of a mighty god, or in its original form, as a kind of ambrosia endowed with wonderfully exhilarating powers. In late Vedic mythology *soma* has become identified with the lunar deity, to whom it seems to have had some relation from the beginning.

Among the Vedic rites the *soma* sacrifices are the most solemn and complicated, and those to which the greatest efficacy is ascribed in remitting sin, conferring offspring and even immortality. They require the attendance of sixteen priests, and are divided into three groups, according as the actual pressing and offering of the *soma* occupies only one day, or between one and twelve days. The performance of all *Śrauta* sacrifices requires two other fires besides that used for domestic rites. The act of first placing the fires in their respective receptacles, after due consecration of the ground, constitutes the essential part of the first duty, which the householder should have performed by four Brahmans immediately after the wedding. To the same class of sacrificial ceremonies belong those performed on the days of the new and full moon, the oblation at the commencement of the three seasons, the offerings of first-fruits, and other periodical rites. Besides these regular sacrifices, the *Śrauta* ceremonial includes a number of most solemn rites, which, on account of the objects for which they are instituted, and the enormous expenditure they involve, could be performed only on rare occasions, and by powerful princes. Of these the most important are the inaugural ceremony of a monarch who claims supreme rule, and the horse sacrifice, one of great antiquity, enjoined by the Brahmanical ritual upon kings desirous of attaining universal sovereignty. Human sacrifices were also performed in the early period, and are recommended as late as the epic. They come into prominence again in the later form of Brahmanism known as Hinduism, in which new gods are recognized. See SAIVAS.

When the householder is advanced in years, when he sees his skin become wrinkled and his hair gray, when he sees the son of his son, the time is said to have come for him to enter the third stage of life. He should now disengage himself from all family ties—except that his wife may accompany him if she choose—and repair to a lonely wood, taking with him his sacred fires and the implements required for the daily and periodical offering. Clad in a deer's skin, or in a single piece of cloth, or in a bark garment, with his hair and nails uncut, the hermit is to subsist exclusively on food growing wild in the forest, such as roots, green herbs, fruits, wild rice, and grain. He must not accept gifts from any one, except what may be absolutely necessary to maintain him; but with his own little hoard he should, on the contrary, honor to the best of his ability those who visit his hermitage. His time must be spent in reading the metaphysical treatises of the Veda, in making oblations, and in undergoing various kinds of privations and austerities, with a view to mortifying his passions and producing in his mind an entire indifference to worldly objects. Having by these means succeeded in overcoming all sensual affections and desires, and in acquiring perfect equanimity toward everything around him, the hermit has fitted himself for the final and most exalted order, that of the devotee or religious mendicant. As such he has no further need of either mortifications or religious observances; but 'with the sacrificial fires deposited in his mind' he may devote the remainder of his days to meditating on the divinity. Taking up his abode at the foot of a tree in total solitude, 'with no companion but his own soul,' clad in a coarse garment, he should carefully avoid injuring any creature or giving offense to any human being that may happen to come near him. Once in a day, in the evening, 'when the charcoal fire is extinguished and the smoke no longer issues from the fireplace, when the pestle is at rest, when the people have taken their meats and the dishes are removed,' he should go near the habitations of men in order to beg the little food that may suffice to sustain his feeble frame. Ever pure of mind, he should thus bide his time, 'as a servant expecteth his wages,' wishing neither for death nor for life, until at last his soul is freed from its fetters and absorbed in the eternal spirit, the impersonal, self-existent Brahma.

The study of the ancient Hindu literature has taught us that some practices which have hitherto, or until recently, prevailed in India, and

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which have contributed much to bring Hindu morals into disrepute, are comparatively modern innovations. Thus, the rite of *suttee* (prop. *sati*, 'the faithful wife'), or the voluntary immolation of widows, which was formally abolished with considerable difficulty in 1829, seems to have sprung up originally as a local habit among the Kshatriyas, and, on becoming more and more prevalent, to have at length received Brahmanical sanction. There is no authority for it in ancient (Vedic) literature, but it is recognized in later epic poetry. Cases of infanticide are still frequent in many parts of India, especially among the Rajputs. The priests have never sanctioned the practice, but they have never tried to suppress it. Its origin has to be sought in the enormous extravagance of wedding feasts, and in a notion that parents are disgraced by their daughters remaining husbandless. The practice of early marriage is, however, sanctioned by the early codes. The cow has been held in high honor in India from early times; but the abhorrence of slaughtering and eating the flesh of kine is of comparatively late origin. It has been conclusively shown that in former times beef formed a staple article of food. Consult: Monier Williams, *Brahmanism and Hinduism* (London, 1887); A. Barth, *Religions of India* (3d ed., London, 1890); and Hopkins, *Religions of India* (Boston, 1895). For particulars and varieties of Hindu doctrines, etc., see BUDDHISM; INDIA; JAINISM; MARUT; SAIVAS; SAKTAS; SIKHS; SURYA; TRANSMIGRATION; UPANISHAD; USHAS; VAISHNAVAS; VEDA; VEDANTA.

BRAHMAPUTRA, brä'mä-pōō'trä (Skt. (*Brahma* + *putra*, son, offspring). A river of Asia, rising as the Sanpo, on the table-land of Tibet, in about latitude 30° 30′ N. and longitude 82° E. Its source, which is near to the headwaters of the Sutlej and Ganges, lies at an elevation of nearly 16,000 feet. The stream takes a generally easterly course to beyond the 94th meridian, when, as the Dihong, it is deflected southward, traverses the Himalayas, and enters upon the lowland plains of Assam. Shortly after leaving the mountains it receives from the east the Lohih or Brahmakunda, which was for a long time considered to be the main river. In latitude 25° 10′ N. and longitude 89° 43′ E. it throws off the Konaie, and after a course of 180 miles is named the Megna. Ninety miles from the sea it combines with the Ganges in cutting up their common delta into a network of inland navigation. A regular steamer service is maintained between Calcutta and Dibrugarh, 800 miles up the river, and vessels of large burden can ascend as high as Gauhati. Total length, about 1800 miles.

BRAHMO-SOMAJ, brä'mō-sō-mäj', or, better written, BRAHMA-SAMAJ (Hind. *Brahma*, Skt. *Brahmā*, Brahma, prayer + *samāj*, assembly for worship). (*Theistic Church.*) A religious and social association in India, originated by the celebrated Hindu Rajah, Rammohun Roy (q.v.), in 1830, under the title Society of God. The conversion of Debendra Nath Tagore, a rich Brahman of Calcutta, in 1842, gave the movement a strong impetus, which, with the spread of English education, succeeded in emancipating it from Vedantism. The latest and most advanced stage in the development of the Brahmo-Somaj took place under Babu Keshub Chunder Sen (q.v.), who joined the Church in 1858. The aim of Sen and his followers was to apply the principles of the sect to practical every-day life, and under his direction the more progressive members withdrew from the original organization and formed the 'Brahmo-Somaj of India.' Their fundamental beliefs are as follows: That there is but one supreme God, the object of worship; that nature and reason are the sources whence we derive our knowledge of God, and that religion allows progressive development. They have renounced all the distinctions of the caste system with which India has so long been fettered, and they consider all men as equally the children of God; they have given up all the old Vedic and Brahmanical sacrifices; they believe in no sacred books or places, but accept whatever is true and good in any religion. In 1880 there were 149 *somajes* scattered throughout India, and of these 44 have *mandirs*, or places of worship. They have established schools, and have published at different times eighteen periodicals, of which six were in English, nine in Bengali, and three in minor vernaculars. They have reformed the abuse of child-marriage and have done much to promote female education. In 1878, some of Sen's followers who disapproved of certain of his tenets, and of his conduct in marrying his daughter at the age of 13 to a Hindu maharajah, seceded and formed the Sadharan (or Universal) Brahmo-Somaj, which soon took the first place among the theistic churches of India. The Arya-Somaj, founded by Dayananda Sarasvati (died 1882), differs from the Brahmo-Somaj in considering the Vedas as divine revelation in which everything true and useful, even the recent discoveries of science, could be found. Consult: *Brahmo Dharma, or Religion of the Brahmos* (1850); *Vindication of the Brahmo-Somaj* (Calcutta, 1860); *Keshub Chunder Sen;* Ghose (editor), *Works in English of Rammohun Roy* (Calcutta, 1888); Mozoomdar, *Life and Teachings of Keshub Chunder Sen* (Calcutta, 1887); F. Max Müller, *Ramakrishna: His Life and Sayings* (New York, 1899); ib., *Auld Lang Syne, Second Series* (New York, 1899); and the *Theistic Quarterly Review*, the official organ of the Brahmo-Somaj, published in Bengal since 1880.

BRAHMS, bräms, JOHANNES (1833-97). An eminent German composer of music, distinguished from his contemporary, Wagner, by his adherence to established forms, which caused the anti-Wagner party to make him their champion. He was born in Hamburg, May 7, 1833. His father, a double-bass player, was his first teacher, but he derived his principal instruction from Edward Marxsen, of Altona. His début as a pianist was made in Hamburg, at the age of 14, when he played a set of variations of his own. In 1853 he made a concert tour with Reményi, the violinist, during which he was 'discovered' by Schumann, who in the *Neue Zeitschrift für Musik* published his famous *Neue Bahnen*, an eloquent welcome to the young musician.

An anecdote, delightfully Brahmsian, tells how Brahms was brought to Schumann's notice. In Göttingen the pitch of the piano was a half-tone low. Beethoven's *Kreutzer Sonata* for violin and piano was on the programme. Without the notes before him, Brahms played the piano part in a key half a tone higher than the original. This unusual feat was witnessed by Joachim, who

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persuaded the young musician to abandon the tour, and gave him a letter to Schumann, whom Brahms forthwith visited, and to whom he showed a number of his manuscript compositions. The result was *Neue Bahnen.*

"Many new and remarkable geniuses have made their appearance," writes Schumann. "I thought to follow with interest the pathways of these elect. There would, there must, after such promise, suddenly appear one who should utter the highest ideal expression of the times, who should claim the mastership by no gradual development, but burst upon us fully equipped, as Minerva sprang from the head of Jupiter. And he has come, this chosen youth over whose cradle graces and heroes seem to have kept watch. His name is Johannes Brahms."

Of all the great composers, Brahms led the most uneventful life. At a period more or less strenuous, when Wagner was establishing a cult in support of his theories, Brahms withdrew almost wholly within his creative art, so that there is no other composer whose life is so fully the tale of his work. It is doubtful whether he personally sympathized with those who set him up as a leader of the anti-Wagner cohorts. Certainly he went his own way quietly enough. He is known to have been a close student of Wagner's scores. The few important extraneous facts of his life are briefly summed up: In 1854 he became conductor for the Prince of Lippe-Detmold. From 1858 to 1862 he was in Hamburg and Switzerland, pursuing further musical studies. In 1862 he was in Vienna, where, in 1863-64, he conducted the Singakademie. He lived in various places, including Baden-Baden, until 1869, when he again went to Vienna. From 1871 to 1874 he was conductor of the Gesellschaft der Musikfreunde. Afterwards he lived near Heidelberg until 1878, when he permanently settled in Vienna. To an offer of the degree of Mus. Doc. from Cambridge University in 1877, he paid no attention; but in 1881 he accepted a Ph.D. from Breslau.

Brahms's service to art consists in his having created, within established forms, music original, modern, and beautiful. Yet he is by no means fully appreciated. One reason for this is that he never, so to speak, led up to himself. The public expect a composer to be 'early,' 'middle,' and 'late.' His 'early,' or more or less imitative, period prepares them for the assertion of his distinctive personality, after he has outgrown the influence of his predecessors. His contemporary fame usually rests upon his 'middle' period.

Brahms was 'late' from the start. Moreover, his appearances as a virtuoso, through which he might have brought the public to a better understanding of his works, became fewer, and finally were abandoned almost wholly as he devoted himself more and more to composition. The work which established his reputation in Germany was his *German Requiem*, first given in its entirety in the cathedral at Bremen in April, 1868. Brahms had conducted vocal societies, and thus had acquired facility in handling choral masses; and he had already composed a number of secular and sacred choruses—among them a *Funeral Hymn*, which seems in a measure to prelude the *Requiem.*

This latter is one of the most important choral works of modern times. It is a 'German' requiem in so far that Brahms, both in form and in spirit, made a radical departure from the requiem of the Latin Church, selecting and arranging the text from the German Bible, and choosing such verses as made it a song of hope rather than of grief; and as the text, though taken from different portions of the Bible, is pervaded by a certain unity of spirit, so this unity is preserved in the music. It is in seven divisions, all of which seem, however, to have sprung from the single idea of hope in a divine future; the impression of unity being enhanced by a repetition, toward the finale of the work, of the principal theme of the first chorus. Besides such technical triumphs as the pedal-point fugue in D in the third chorus, and the climacteric double fugue at the end of the sixth, the work abounds in tender and benign passages, of which, perhaps, the most exquisite is that message of peace, "Yea, I will comfort you," for soprano solo and chorus, in the fifth division.

This requiem is Brahmsian to the core. It is faultless as regards form; but, while conservative in this respect, it is, musically, modern of the modern. Even the fugues belong to the Nineteenth Century. They are, perhaps, the only fugues composed since the passing away of the great contrapuntists, that do not wear perruques.

It is the great distinction of Brahms to have shown that thoroughly modern music can be composed within established forms. Brahms is the successor of no classical composer. He has been a conservator of classical form, especially in his symphonies, sonatas, and works of chamber-music; but in the music which he has created within these forms he has shown himself an original and modern composer.

In his symphonies and his chamber-music, Brahms again shows his complete mastery of form—that mastery which controls instead of being controlled, and does not hesitate to make innovations where these grow out of artistic necessities. For instance, in his piano quintet, he developed the first movement to the extent of introducing a third theme in addition to the two sanctioned by tradition. The last movement of his *Fourth Symphony* is new in symphonic writing—so new that it has proved somewhat of a crux even to Brahmsians. It is, however, nothing more than an eight-bar theme with variations—a revival of the old *passacaglia.* The variations bear the Brahms stamp. Each is characteristic and individual, yet is obviously related æsthetically to the original theme. The *scherzo* movement of the symphony has been changed by Brahms into a kind of intermezzo, a word not used here in its technical sense. These intermezzi are among the most charming things he has composed. They form points of rest between the longer divisions of his symphonies. While not less valuable than the symphonies, in technical construction, the intermezzi appeal more readily to the emotions, and, therefore, were almost immediately appreciated. Among his other orchestral works are a series of adaptations of Hungarian dances, which have been very popular.

Brahms composed nearly one hundred and sixty songs. His last published work was a group of *Ernste Lieder* (Serious Songs). Upon his songs alone his fame could safely rest. Still working within established forms, he poured thoroughly original and thoroughly modern music

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into them. His are the most modern songs—more modern even than those of Schumann or Franz. Brahms, in setting a poem to music, seeks to interpret the emotional significance of the work as a whole. This emotional trend of the words he embodies in his vocal melody. A Brahms song is not a realistic expression of every passing mood, that is reflected in the poet's lines. It is meant to be the musical expression of the thought or feeling out of which the poem grew, and so includes the lesser moods in the greater as it develops toward its climax. Here we have an illustration of Brahms's power of concentration. The inter-relation between the vocal melody and the accompaniment is absolute. The latter rarely carries the melody, but is closely interknit with it harmonically.

There is one great characteristic of Brahms which no student of his songs can fail to appreciate. His climaxes are musical in the strictest sense. Take, for instance, *Wie bist du, meine Königin*—perhaps the most frequently sung of his *Lieder*. The climax is reached on the very last word of the poem—the exclamation *Wonnevoll!* It is thrice repeated. Brahms produces, on the third repetition, a climax neither loud nor strenuous, but deep and moving; and this emotional wrench is not due to a massing of chords, nor to uprushing runs, but to a simple prolongation of a phrase by one bar, and a descending sweep of the voice.

For the piano Brahms has composed two concertos, several sets of variations, and shorter pieces, among them the series from *Op. 116-119*, which preceded the *Serious Songs*, his last work. Modern piano music usually echoes Chopin and Liszt. Brahms, however, was gifted with genius enough to enable him to work independently of those two great masters.

Brahms not only never attempted to compose an opera, but did not care for opera as an art-form. He rarely visited the theatre, and more rarely sat through an entire operatic performance. Not infrequently, after the first act, he would remark to his companion, "You know I understand nothing about the theatre," and would then rise and leave. So far as he can be said to have had any preference at all among modern operas, his favorite was Bizet's *Carmen*. As a man, he had an aversion to marriage; as a composer, to opera; and he classed them together. "Toward marriage," he once said, "my position is the same as toward opera. If I had already composed an opera and, for all I care, seen it fail, I should certainly compose another. But I cannot make up my mind to a first opera or a first marriage."

Brahms died in Vienna, April 3, 1897. Until overtaken by the disease which proved fatal, he enjoyed rugged health. It was said of him that he "made foot-tours like a student, and slept like a child." He appears also to have been a child of nature in social intercourse: which gave rise to the anecdote of his parting remark at a musical soirée in Vienna: "I beg the company's pardon if I have neglected to offend anybody this evening." Consult: Deiters, *Brahms, a Biographical Sketch*, translated by Rosa Newmarch (London, 1888); Dietrich and Widmann, *Recollections of Johannes Brahms*, translated by Dora E. Heclet (London, 1899).

BRAHUI, brä-hōō'ē. The aboriginal population who preceded the Baluchis in Baluchistan, and are now the dominant people. Both physically and linguistically they are said, although the matter is still obscure, to be related to the Dravidian tribes of India. The Brahui profess the Sunnite creed of Islam with native additions and modifications. Physically they are well built, thick-set, short in stature as compared with the tall Baluchis, and have round faces, with brown hair and beards. Some of these traits may be due to their mountain environment. They are altogether a most interesting primitive people. An account of the Brahui is given in Bellew, *Indus to Euphrates* (London, 1874).

BRAID, James (c.1795-1860). An English physician; born in Fife, Scotland. He studied medicine in Edinburgh, and settled as a surgeon in Manchester. He is especially noted for his researches on the subject of animal magnetism, for which he originally used the term *neurohypnotism*, later shortened into the term *hypnotism*. He read a paper at the meeting of the British Association in Manchester on June 29, 1842, entitled *Practical Essay on the Curative Agency of Neurohypnotism*, and in 1843 he published his work *Neurypnology; or, the Rationale of Nervous Sleep considered in relation to Animal Magnetism*. See Hypnotism.

BRAID'ISM. See Hypnotism.

BRAID'WOOD, Thomas (1715-1806). An early and successful Scottish teacher of deaf mutes. He first started his school in 1760 in Edinburgh, but in 1783 removed to Hackney, near London. His method was not allowed to be known outside his own family for many years, consequently his family enjoyed a monopoly, teaching it after his death. He used the Heinicke system principally, "reading from the lip," giving prominence to attempts at articulation. A little work, called *Vox Osculis Subjecta*, published by an American, Green, whose son was educated there, gives a good idea of the school in Edinburgh.

BRAIL (OF. *braiel*, a breech-girdle, cincture, from Lat. *bracæ*, breeches). A rope fitted to a fore-and-aft sail for the purpose of hauling it in to the mast when taking it in (the reverse of setting, or spreading it). Brails are usually fitted in pairs and lead from the after bolt-rope of the sail to small blocks or dead-eyes on the mats and thence down to the deck. To 'brail up' is to haul the sail close in to the mast ready for furling.

BRAÏLA, brä'ē-là, **BRAILOV**, brä'ē-lôv, or **IBRAIL**, ē-brä'ēl. A town of Rumania, in Wallachia, situated on the left bank of the Danube, about 102 miles northeast of Bucharest. It contains a number of churches and synagogues, but is of little architectural interest. Braila is a place of great commercial importance, being the centre of the grain export trade of Wallachia. After 1774 it was converted into a strong fortress by the Turks, but was unable to withstand the Russians in 1828. It has ceased to be a fortress, Galatz having supplanted it. Population, in 1899, 58,392, including a number of Greeks and Bulgarians.

BRAILLE, Louis (1806-52). A French teacher of the blind, who himself was blind from his third year. He was born at Coupvray, and in 1816 went to the Institute for the Blind in Paris, as a foundling. He became a teacher there in 1828, and in 1829 devised his point system of

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writing for the blind. See BLIND, EDUCATION OF THE.

BRAIN. See NERVOUS SYSTEM.

BRAIN, DISEASES OF THE. These consist of disturbances of the circulation; inflammations following infection, injury, etc.; hemorrhages, degenerations, scleroses, softening, malformations, and disorders called functional because no anatomical lesion is found after death that is regarded as due to the disorder or causative of it. A few of the common diseases of the brain will be considered. *Anæmia* and *hyperæmia* of the brain are conditions, rather than diseases, and are considered here for convenience' sake. In the latter there is an excessive amount of blood in the cranial cavity, in the former there is too small an amount of blood in the vessels of the brain. Anæmia may be due to arterial disease, kidney disease, syphilis, wasting diseases, hemorrhages, faulty digestion, or fright. Its symptoms are faintness, vertigo, confusion of mind, and nausea. Hyperæmia is caused by the use of alcoholic beverages, by injury, sunstroke, prolonged mental overwork or worry, or by obstruction to the return of blood from the brain. The symptoms are headache, vertigo, insomnia, ringing in the ears, confusion of ideas or inability for mental application. These conditions require careful expert treatment. *Abscess* of the brain is an acute suppurative inflammation of a small part of the brain-substance, with a production of pus. It is caused by infection by pus-germs from middle ear or mastoid disease, by an injury, by the presence of a tumor of the brain, or by infectious diseases, such as diphtheria, typhoid fever, smallpox, *la grippe*, etc. Paralysis generally occurs, with headache, vomiting, and delirium. Trephining is the only treatment. 'Softening of the brain' is the common (erroneous) term for any form of mental disease in which there is failure of mental power; and especially for general paralysis of the brain, in which in reality a hardening occurs. True softening follows embolism (q.v.) or thrombosis (q.v.), in which the blood-supply is cut off from a part of the brain, which generally becomes red or yellow, dies and softens, and may be absorbed or may go on to the production of abscess. Softening causes marked mental changes resembling those of dementia (q.v.), and sometimes paralysis. Brain-palsies of children are either paralysis of one side of the body, or of both sides of the body, or of both lower extremities. The lesions are in the upper motor segments of the hemispheres of the brain, and are due to injuries or disease of the mother during pregnancy, injury of the child during birth, or injuries or infectious fevers in very early childhood. Wasting of the paralyzed limbs occurs as the children grow, with the production of contracted muscles, clenched hands or club feet. *Brain fever* is a popular and erroneous term which is generally applied to meningitis, though used for other affections and conditions without intelligence. *Inflammation of the brain* is also an erroneous term, signifying usually abscess of the brain, or necrosis and microbiosis due to injury and infection, or even meningitis. *Tumors* may be either tubercle, syphiloma, glioma or sarcoma, or other less common forms, as all varieties of new growths may be found in the brain. They are all rare. They generally cause intense and constant headache, vomiting, with or without nausea, vertigo, changes in sensation, convulsive movements of upper or lower extremity or of face without loss of consciousness, deterioration of sight and some mental defect. Treatment depends upon the variety of tumor and its location. Tubercular or syphilitic tumors are the most favorable, as regards possibility for treatment. See APOPLEXY; APHASIA; CONCUSSION; EMBOLISM; THROMBOSIS; EPILEPSY; PARALYSIS; SCLEROSIS; SYPHILIS.

BRAIN'ARD, DAVID LEGGE (1856—). An American explorer; born in Norway, Herkimer County, N. Y., and educated in the common schools and the State Normal school. He enlisted as a private in the United States Army in 1876, and served in Indian campaigns under Gen. Nelson A. Miles. In 1881 he was first sergeant of the Lady Franklin Bay expedition under Lieutenant (now General) A. W. Greely, and was a member of the party of three who (on May 15, 1882) reached the latitude of 83° 24′ 30″. This remained the highest latitude reached by explorers for thirteen years, and the most northern known point of land for eighteen years. Upon his return he became a sergeant in the Signal Service, and afterwards was commissioned a second lieutenant in the Second United States Cavalry. He served in the Alaskan Government relief expedition in 1897, was made a colonel in the subsistence department of the United States in 1898, and went to the Philippines in 1900 as major, in that department, in the regular army. Subsequently he became purchasing commissary for the army, with headquarters in New York City.

BRAINARD, JOHN GARDINER CALKINS (1796-1828). An American poet and editor, born in New London, Conn., October 21, 1796. He was graduated at Yale in 1815; studied law; practiced at Middletown, Conn.; but in 1822 went to Hartford to edit the *Connecticut Mirror*, which he brought into general notice by his literary contributions, especially ballads. After five years, failing health obliged him to give up his editorship, and after brief retirement in Long Island he returned to New London to die, continuing poetic composition to the last. He had collected his poems in 1825. A full edition, *Literary Remains*, with a biographical sketch, was made by John G. Whittier, his successor as editor of the *Mirror*, in 1832. It passed through three editions in ten years, but his facile verse is now almost forgotten. Brainard died in New London, September 26, 1828.

BRAINE-LE-COMTE, brân'le-kōnt' (anciently, Lat. *Brennia Comitis*). A town in the Province of Hainaut, Belgium, 19 miles southwest of Brussels (Map: Belgium, C 4). It formerly belonged to the monks of Saint Waudru at Mons, from whom it was bought by Count Baldwin in 1158. It has an old church of the Thirteenth Century; cotton and corn mills, dye-works, breweries, and stone-quarries. A very fine quality of flax is grown in the district. Population, in 1899, 8891.

BRAINERD, brān'ẽrd. A city and county-seat of Crow Wing County, Minn., 136 miles north by west of Saint Paul: on the east bank of the Mississippi River, and on the Northern Pacific and the Minnesota and International railroads (Map: Minnesota, D 4). The Northern Pacific has here large machine, car, and other

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shops, and a hospital for its employés. The city contains also a lumbermen's hospital, a United States signal station, fine court-house and Y. M. C. A. buildings, a public park, and athletic grounds. A dam across the Mississippi furnishes water-power for various manufactures. There are extensive lumber-mills, cigar-factories, large foundry and machine shops, flour-mills, brewery, etc. The city is important as the commercial centre for the adjacent region, the export trade consisting largely of lumber, grain, agricultural produce, furs, etc. Brainerd, chartered in 1883 as a city, is governed by a mayor, elected every two years, and a city council. Population, in 1890, 5703; in 1900, 7524.

BRAINERD, DAVID (1718-47). An American missionary; born in Connecticut. His missionary work was among the Indians in Massachusetts and those around the Delaware and Susquehanna rivers. President Jonathan Edwards wrote his biography (Boston, 1749). It is a missionary classic (best ed. J. M. Sherwood, New York, 1884), and that and Brainerd's *Journals* are well known. His brother, JOHN BRAINERD (1720-81), continued his labors among the Indians.

BRAIN FEVER. See BRAIN, DISEASES OF.

BRAINSTONE. See CORAL.

BRAIN'TREE'. A town, including the villages of South and East Braintree, in Norfolk County, Mass., 10 miles south of Boston; on the New York, New Haven and Hartford Railroad. It has granite-quarries, metal-foundries, and manufactures of boots, shoes, leather, paper, nails, tacks, absorbent cotton, electrical machinery, filters, etc. (Map: Massachusetts, E 3). The town contains Thayer Academy and the Thayer Public Library. The government is administered by town meetings. First permanently settled in 1634, when the General Court of Massachusetts ordered that Boston, being "too small to contain many," "shall have convenient enlargement at Mount Wollaston," Braintree was incorporated as a town in 1640. In the portion of old Braintree now included within the limits of Quincy, Thomas Morton (q.v.) established his "New Canaan" at "Merrymount" (Mount Wollaston), and John Adams, John Hancock, and John Quincy Adams were born. The township included Quincy (q.v.) until 1792, and Randolph until 1793. Population, in 1890, 4848; in 1900, 5981. Consult: Pattee, *History of Old Braintree and Quincy* (Quincy, 1878); Adams, *Three Episodes of Massachusetts History* (Boston, 1892); and Bates (ed.), *Records of the Town of Braintree from 1640 to 1793* (Randolph, Mass., 1886).

BRAIN'WORM'. The name of a resourceful servant in the employ of the elder Knowell, in Jonson's *Every Man in His Humour* (1598).

BRAITH, brīt, ANTON (1836—). A German painter; born in Biberach (Württemberg). He studied at the Stuttgart Art School and the Munich Academy, and has gained high rank as an animal painter. His works include "Herd at the Brook" (1873); "Herd Overtaken by Storm" (1874); "Going to Drink" (1888); and "After the Storm" (1896).

BRAIZE (probably akin to *bream*, OF. *bresme;* cf. OHG. *brahsima, brahsa,* bream), or BECKER. (1) A British sparoid marine food-fish (*Sparus pagrus*), commonly called porgy, scup, or king of the breams. See BREAM. (2) In Scotland, the roach.

BRAKE (OE. *brake;* LG. *brake,* Ger. *Breche,* a tool for breaking flax, from the same root as *break*). A mechanical contrivance consisting usually of a shoe or band applied to the surface of a rotating shaft or wheel in such a manner that motion is retarded by means of the friction. A shoe-brake consists of a wood or metal block or shoe which is pressed against the rim of a wheel by means of a system of levers. The hand-brakes used on railway-cars and the foot or hand brake used on horse-drawn vehicles are familiar examples of shoe-brakes. Band brakes consist of a flexible band looped around the perimeter of the wheel, and contrived so that it may be tightened and thus grip the wheel. Such brakes are extensively used on hoisting-engines and automobiles, and also on some makes of bicycles. Perhaps the most elaborate braking mechanism in common use is the air-brake for railway-cars. (See AIR-BRAKE.) The Prony brake is a form of band brake used to measure the horse-power of a rotating shaft or pulley, and is more properly classed as a dynamometer than as a brake.

BRAKE (AS. *bracce,* a fern). A popular name for the European and North American ferns of the genus Pteris. This genus is a member of the family Polypodiaceæ, and is distinguished by having the spore-cases situated along the edges of the leaves and covered by the reflexed margin on the frond. The common brake or bracken (*Pteris aquilina*) is very abundant in most parts of the continents of Europe and America, growing in heaths, parks, etc., often covering considerable tracts. It is a widely distributed plant, and is found also in many parts of Asia, and in some parts of Africa. It has a long, creeping, black rhizome, or rootstock, from which grow up naked stalks of eight to eighteen inches or more in height; each stalk divides at the top into three branches; the branches are bipinnate, the inferior pinnules pinnatifid. The rootstock, when cut across, exhibits an appearance which has been supposed to resemble a spread eagle, whence the specific name *aquilina* (Lat. *aquila,* an eagle). The rootstock is bitter, and has been used as a substitute for hops; it has also been ground, mixed with barley, and made into a wretched bread in times of distress. The plant is astringent and anthelmintic, and as such it had at one time a high reputation, although it is now little used, at least by medical practitioners. It is employed in dressing kid and chamois leather. Brake is also employed for thatching, for littering cattle, etc., and is occasionally chopped up with straw or hay for feeding cattle. It is a favorite cover of deer and other game. The abundance of this plant is sometimes regarded as a sign of poor land, although, probably, its absence from the richer soils is very much a result of cultivation. To extirpate it, nothing more is necessary than a few successive mowings of the young shoots as they appear. The annual growth of brake is killed by first frosts of autumn, but remains rigid and brown, still affording shelter for game, and is almost as characteristic a feature in the landscape of winter as in that of summer, perhaps adding to its general desolateness. *Pteris caudata,* a large species of brake, very similar to that of Europe, is one of

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BRAKE AND BIRCH

1. BRAKE (Pteris aquilina).

2. COMMON WHITE BIRCH (Betula alba), in early May near New York City.

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the worst pests which the farmer has to contend with in the south of Brazil. *Pteris esculenta*, a native of New Zealand, Van Diemen's Land, etc., has a rhizome more nutritious than that of the common brake. Two species, *Pteris Cretica* and *serrulata*, are common household plants. *Fossil Forms.*—No very ancient species of Pteris are known. Some species have been described from the Miocene beds of Western America and from the Tertiaries of Europe.

BRAKELONDE, brāk'lōnd, JOCELIN DE. See JOCELIN DE BRAKELONDE.

BRA'MA (probably akin to *bream;* see BRAIZE). A genus of fishes of the family Chætodontidæ. *Brama raii* is common in the Mediterranean, and occasionally found on the British shores, where it is called sea-bream and gilthead. The genus has the body very deep and compressed, the head rather obtusely terminated, a single elongated dorsal fin, and the anal fin with a very lengthened base. The tail is forked, its points extremely divergent. This fish is sometimes more than two feet in length. Its flesh is of exquisite flavor. See SEA-BREAM.

BRAMAH, brā'mâ, JOSEPH (1749-1814). A practical machinist, born at Stainborough, Yorkshire, England. Unable to work on his father's farm on account of lameness, he was apprenticed to a carpenter and joiner, and afterwards obtained employment with a cabinet-maker in London, where subsequently he established himself in business and became distinguished for the number, value, and ingenuity of his mechanical inventions, such as safety-locks and improvements in pumps and fire-engines, in the construction of boilers for steam-engines, in the processes of making paper, in the construction of main-pipes, wheel-carriages, printing-machines, and the beer-machine used at the bar of public-houses. In 1795 he patented the hydrostatic press known by his name.

BRAMAH'S PRESS. See HYDROSTATIC PRESS.

BRAMANTE, brâ-mān'tâ, DONATO D'AGNOLO (?1444-1514). An Italian architect. He was born at Monte Asdroaldo, near Urbino. He first practiced painting under Piero della Francesca and Mantegna, and executed works in Milan and Bergamo (1742-77); but he soon devoted himself entirely to architecture. His career falls into two main divisions—(1) the twenty-eight years of early work in Milan, 1472-99; and (2) the fifteen years of work in Rome, 1499-1514. Each period is marked by a style so distinct as to make it seem impossible that the same master should have created both. By his Milanese works he founded the Lombard Early Renaissance, which from him is called 'Bramantesque Style.' The most important are the transept, apse, and sacristy of San Satiro (c.1480-88); his masterpiece in decoration and composition, the choir and dome of Santa Maria della Grazie, with its perfect union of brickwork with details in terra-cotta and marble, and besides these, parts of the Monastery of San Ambrogio and of the Ospedale Maggiore. Outside of Milan are the simple but masterly composition of a façade at Abbiategrasso and the octagonal Canepanova Church in Pavia. He established a school, as is shown by such works as the Incoronati in Lodi, and long after his departure from Milan his influence remained supreme in Lombardy, as is shown by churches in Legnano, Arsizio, Canobbio, etc.

At the age of fifty-five Bramante went to Rome. Hitherto he had seen the antique through the interpretations of his Renaissance predecessors, from Brunelleschi (q.v.) to Fra Giocondo (q.v.), through such masters as Alberti (q.v.) and Laurana (q.v.). He now went for the first time to the fountainhead. The influence of the Roman monuments was so overpowering as entirely to transform his style—a remarkable fact, considering his age. His new manner inaugurated the period of the Middle Renaissance, of which he became the leader. The patronage of the Popes gave him the opportunity. Alexander VI. and Julius II. employed him on important buildings. It is necessary, however, to correct the old error that the magnificent Cancelleria Palace in Rome was by him. It was by an earlier architect, and all its numerous derivatives are independent of Bramante. Bramante brought to Rome his love of dome-construction, of engaged columns and pilasters, derived from mediæval art, as well as a thorough knowledge of perspective and of the engineering and constructive side of his art. His own genius and eye for beauty were the media that joined these elements to the simpler, broader, and more uniform forms of Roman architecture. He also largely adopted stone in place of brick and terra-cotta, and this was not without influence on his style. He expressed himself almost immediately in an exquisite gem, the circular tempietto at San Pietro in Montorio, famous "as the first building after a lapse of 1200 years built entirely in the ancient spirit and style." Soon after came the cloister of Santa Maria della Pace, also a classic, an exact reproduction of the order of the theatre of Marcellus. This also was revolutionary. Both buildings gave the tone for the pure, cold style of the Sixteenth Century.

Bramante was then intrusted with the planning of the greatest architectural labor of the Renaissance, the reconstruction of the Vatican Palace and of Saint Peter's. His masterly conception was never carried out. The Cortile di Santo Damaso alone shows part of his Vatican plan, and his scheme of a Greek cross with central dome was partly set aside. His death in 1514 put both these undertakings into other hands. But during his last years he had developed his latest manner, as is shown in his own palace in Rome ('Raphael's house'), and in the Palazzo di San Biagio, where the rustic work on the lower story and the engaged column above, with gabled windows, furnished a type that was used by Raphael, Sanmicheli, Sansovino, Palladio, and other leading architects. Bramante's plans for Saint Peter's, though only partly carried out, were known through drawings to all architects, and exercised an enormous influence, greater than that of any actually constructed building of the Renaissance.

BRAMBACH, brām'bäg, KASPAR JOSEPH (1833—). A German composer. He was born in Bonn, and was a pupil of Ferdinand Hiller. He was first violinist of the opera orchestra in Bonn, from 1847 to 1850, and musical director in that city from 1861 to 1869. His works include an opera, *Ariadne*, and the well-known cantatas, *Das eleusische Fest* (op. 32); *Trost*

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in Thränen (op. 10); *Die Macht des Gesanges* (op. 6); *Columbus* (op. 58, 1886); *Frühlingshymnus* (op. 37); *Alcestis* (op. 14); and *Prometheus* (op. 47), all of which enjoy considerable popularity and are frequently performed.

BRAMBLE (akin to Ger. *Bram, Brame*, the broom-tree). A name used in America as a collective term for all plants of the raspberry, blackberry, and dewberry class. In Great Britain it is used to distinguish the native blackberry (*Rubus fruticosus*) from the raspberry and others of that type. The bramble is a common wild plant in Great Britain and most parts of Europe. Although it is abundant everywhere and bears fruit of a good quality, it has never attracted much attention from cultivators, because of its weedy nature. In fact, it was considered a nuisance, and was so referred to in literature as far back as Shakespeare's time. See BLACKBERRY and RUBUS.

BRAMBLE, FREDERICK. A character in *The Poor Gentleman*, a play by the younger Colman (1802).

BRAMBLE, MATTHEW. A character in *Humphrey Clinker*, a novel by Tobias Smollett.

BRAMBLE, PHILIP. The Thames River and coast pilot to whom Poor Jack is apprenticed in Marryat's novel of *Poor Jack*, and whose daughter Jack marries.

BRAMBLE, Sir ROBERT. The name of a character in the younger Colman's play, *The Poor Gentleman*.

BRAMBLE, TABITHA. The name of a character in Smollett's *Humphrey Clinker*, sister to Matthew Bramble.

BRAMBLING (from *bramble;* Ger. *Brämling*), or MOUNTAIN FINCH. A large, brightly colored finch (*Fringilla montifringilla*) nearly allied to the chaffinch, which, during migrations, appears in large numbers throughout Europe and parts of Asia, to the northern borders of which it resorts to breed in the birch forests.

BRAMP'TON. The capital of Peel County, Ontario, Canada, and a busy junction of the Canadian Pacific and Grand Trunk railways; 21 miles west of Toronto. It has agricultural and domestic industries, and a considerable trade (Map: Ontario, D 4). Population, in 1891, 3252; in 1900, 2748.

BRAM'WELL, Sir FREDERICK JOSEPH (1818—). An English civil engineer; born in London. In 1856 he became an associate of the Institution of Civil Engineers, and in 1874-75 its president. In 1888 he was elected president of the British Association. He has been prominent in many important undertakings in connection with his profession, and was also long active in endeavoring to promote the technical education of workingmen.

BRAMWELL, JOHN MILNE (1852—). An English physician and author. He was born at Perth, N. B., and was educated at the University of Edinburgh. He has devoted considerable attention to hypnotism, and has combined the French methods of hypnosis respectively employed in Paris and Nancy with good results. His publications include: *Successful Treatment of Dipsomania, Insomnia, etc., and Various Diseases by Hypnotic Suggestion* (1890-92); *Hypnotic Anæsthesia* (1896); *What is Hypnotism?* (1896); *On the Appreciation of Time by Somnambules* (1896); *Suggestion: Its Place in Medicine and Scientific Research* (1897).

BRAN (OF. *bren, bran*, bran; Welsh, Irish *bran*, husk, chaff). The outer coat of wheat, rye, and other cereal grains, separated from the flour in milling by bolting. Wheat-bran is often spoken of simply as bran, while rye-bran, corn-bran, rice-bran, etc., are usually referred to under their full names. Wheat-bran is extensively used and highly prized as a feeding-stuff for nearly all kinds of farm animals. Fed with corn-meal (maize), the combination is hardly surpassed for cows, the bran furnishing not only the bulk, but the protein and ash which are necessary to milk-production. The other kinds of bran are much less abundant in quantity, but are utilized quite generally for feeding purposes. The average percentage composition of different kinds of bran, from a large number of American analyses, is shown by the following table:

KIND OF BRAN	Protein	Nitrogen-free Extract	Fat	Fibre	Ash	Water
Bran from Spring and Winter Wheat	15.4	53.9	4.0	9.0	5.8	11.9
Rye-Bran	14.6	64.0	2.8	3.4	3.4	11.8
Rice-Bran	12.6	50.0	9.5	8.9	9.4	9.8
Corn-Bran	9.6	63.1	5.8	11.7	1.4	8.4
Buckwheat-Bran	23.9	43.2	6.7	10.5	4.5	11.2

Middlings, or shorts, contain some of the finer bran and coarse flour, although they are of the same origin as bran—viz., from the outer coat of the grain. They contain less fibre and ash mineral matter than bran, and are considered better suited to pigs and horses.

The black woody hulls of the buckwheat-grain have little feeding value; but the portion lying immediately under the hulls, which forms the middlings, is rich in protein and fat, and has a high feeding value. The hulls and middlings are often mixed and sold as buckwheat-bran, in which case the proportion in which they are mixed determines the value of the bran.

Wheat-bran contains in 1000 pounds about 265 pounds of nitrogen, 290 pounds of phosphoric acid, and 160 pounds of potash. The same amount of rye-bran contains 230 pounds of nitrogen, 230 pounds of phosphoric acid, and 140 pounds of potash. Hence, in feeding these materials, the fertility of the farm is being added to if the manure is properly cared for and used. Bran is used in dyeing and in calico-printing.

BRAN. The dog of Fingal. There was a Scotch tradition, before Macpherson's *Ossian* appeared, that a Southern chief challenged Fingal to hunt Bran in Sledale against his own dog, Phorp, of the same breed, the present Scotch deerhound. The dogs ran equally well all day; so, as a further test, their owners set them fighting. Bran was getting the worst of it, when the chief said something about Bran which angered Fingal, who seized Phorp, and, with his charmed hand, tore his heart out. But

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Bran suffered so in the fight that he died in Glen Loch, and was buried there.

BRAN, THE BLESSED. The name of the hero of the poem *Myvyrian*, by Taliesen. He was the knight who found a vessel of decoration and mystic connections similar to those of the Holy Grail.

BRANCA, brăn'kâ, ASCANIO (1840—). An Italian statesman. He studied law at the University of Naples, became known as a journalist and economist, and in 1870 was elected to the Chamber of Deputies, where in 1885 he joined the party of the opposition. In 1891-92 he was Minister of Public Works, in 1896-98 of Finance, and again in 1900-01 of Public Works. He has published *Le crédit et la banque internationale* (1871).

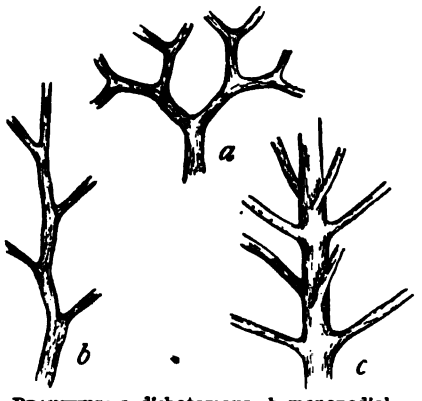
BRANCH. See BRANCHING.

BRANCH, JOHN (1782-1863). An American politician. He was born in North Carolina, and graduated at the State University in 1801. He was State Senator from 1811 to 1817, Governor of North Carolina from 1817 to 1820, and from 1823 to 1829 served in the United States Senate. He then was Secretary of the Navy under President Jackson from 1829 to 1831, a Democratic member of Congress from 1831 to 1833, and Governor of the Territory of Florida from 1844 to 1845.

BRANCHIATA, brăn'kĭ-ā'tâ (Neo-Lat. neut. pl. of *branchiatus*, having gills, from Lat. *branchiæ*, Gk. *βράγχια*, *branchia*, gills). One of the two great branches or sub-types into which the *Arthropoda* are divided, the other being the *Tracheata* (q.v.). They are characterized by the presence of gills in some form, though it may be only as thin portions of the body-integument. They have no tracheæ or tracheal tubes of any sort, and breathe air only as it is present in water. Many of the very small forms, and some of the larger ones, apparently have no distinct gills, but receive the oxygen which they need through a part or all of the body-surface. In accordance with their manner of breathing, the branchiata live in water either fresh or salt; and the exceptions to this rule are to be found only among the higher groups, where certain species have special structural features that enable them to live a greater or less time on land, usually, however, in damp places. The classification of the branchiata is one of the perplexing problems of zoölogy: for while the one class Crustacea (q.v.) is well defined, there are a few other living, and many fossil forms, which present the greatest difficulties.

BRANCHIDÆ, brăn'kĭ-dē (Gk. *Βραγχίδαι*, *Branchidai*, also called *Didymi* (*Δίδυμοι*, *Didymoi* or *Didyma*, *Δίδυμα*). A place on the seacoast of Ionia, a little south of Miletus and near Panormus, celebrated for its temple and oracle of Apollo Didymeus. The hereditary ministers of this oracle, which was one of the most famous of the Greek world, were the Milesian Branchidæ, who traced their descent from Branchus, a favorite of Apollo. When the oracle was instituted is not known, but its first period of great celebrity was in the Sixth Century B.C. The temple and oracle were destroyed, either (according to Herodotus) by Darius at the time of the destruction of Miletus (B.C. 494), or (according to Strabo, Plutarch, and Pausanius) by Xerxes some years later. The temple was afterwards rebuilt, but on so grand a scale that it was never fully completed, and always remained without a roof; its ruins contain some beautiful specimens of the Ionic order of architecture. Consult Gelzer, *De Branchidis* (Leipzig, 1869); O. Rayet, *L'architecture ionique en Ionie: Le temple d'Apollon Didyméen* (Paris, 1876).

BRANCHING (Fr. *branche*, branch, It. Sp. *branca*, branch, claw, from Low Lat. *branca*, claw, possibly from Lat. *bra[c]chium*, arm, claw). There are two general types of branching, known as the 'dichotomous' and the 'monopodial.' In the former, the apex of the axis forks, the old axis ending at the point of branching. In some cases three branches may arise in this way, resulting in 'trichotomy,' or even more than three branches may arise by the division of a growing tip, but the term dichotomy is a general one, covering all cases of branches arising in this way, without reference to the number. Thallus bodies are particularly inclined to dichotomous branching, and hence its chief display is among the algæ and fungi, the liverworts, and the prothallia of ferns. Among seed-plants there are cases which resemble dichotomy, as in the branching of the lilac, but this is 'false dichotomy,' because, although two branches seem to arise from the apex of an axis in forking fashion, they are really lateral branches, the apex of the old axis remaining between them undivided but arrested in growth.



BRANCHING: *a*, dichotomous; *b*, monopodial; *c*, sympodial.

In monopodial branching the branches arise laterally from the axis. This type is characteristic of the seed-plants, but it is found in the lower groups as well. In this case the tip of the main axis may continue to grow vigorously, and a central shaft may develop, as in the pines and firs; such a habit is called 'excurrent,' the main shaft 'running through' the whole branch system. In other cases, as in the elm, some of the lateral branches are more vigorous than the main axis, which is presently lost sight of, and the trunk seems to be replaced above by a set of large divergent limbs, a habit called 'deliquescent,' meaning that the main axis is 'dissolved' into branches. Sometimes what appears to be the main axis is really a series of strong lateral branches which simulate it. A strong lateral branch appears just behind the tip of the axis, pushes it aside in its growth, and continues the

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direction of the main axis; then a lateral branch from this first branch does the same thing, and so on, until the principal axis consists of a series of strong lateral branches, as in the linden. Such an axis is called a 'sympodium,' and this sympodial development is apt to be characteristic of groups of plants.

The branching of roots is never so symmetrical as that of stems, the branches arising from any point, while those of the stems are related very definitely to the nodes, at which the leaves appear. Another characteristic of root-branching is that the branches arise from the central woody cylinder and burrow their way through the cortex; while in stems the branches arise superficially, of course involving also the deeper tissues. The root type of branch origin is said to be 'endogenous' ('inside origin'), and the stem type is 'exogenous' ('outside origin'). This is the proper application of the terms 'endogenous' and 'exogenous,' which were formerly misapplied to the stems of monocotyledons and dicotyledons respectively.

Leaves also frequently branch, and when the branches are quite distinct the leaves are said to be compound. This branching is determined by the venation, which is the system of vein branching. Accordingly, branching leaves may be either palmately or pinnately compound. See LEAF.

BRANCHIOPODA, brăn'kĭ-ŏp'ō-dȧ (Gk., gill-footed, from *βράγχια, branchia*, gills + *πούς, pous*, foot), or EUPHYLLOPODA. A suborder of Entomostraca, with numerous *branchiæ*, or gills, attached to the feet; water-fleas. The term has been used by different authors in a most confusing manner, but the latest writers regard the group as a division of Phyllopoda. Used in this sense the Branchiopoda may be defined as phyllopods with numerous distinct trunk-segments and numerous pairs of swimming-feet. There are three families containing about a half-dozen genera and not many species. The families are distinguished by the carapace, which is wanting in one, shield-shaped in the second, and bivalve in the third.

BRANCHIOSAURUS, brăn'kĭ-ō-są'rŭs. See STEGOCEPHALIA.

BRANCO, brăn'kō (Port., white, Sp. *blanco*, It. *bianco*, Eng. *blank*), RIO. The principal tributary of the Rio Negro, Brazil (Map: Brazil, E 3). Its head stream, the Parima, rises near the frontier of Venezuela in the Parima Mountains. The Branco flows southwest, and is 375 miles long.

BRAND, brănt, JAN HENDRIK (1823-88). A President of the Orange Free State, born in Cape Town and educated in England. In 1864 he was elected President of the Orange Free State, and was successively reëlected in 1869, 1874, 1879, and 1884. In 1876, at the request of Lord Carnarvon, he visited England for the purpose of taking part in a conference which had as its object the establishment of a confederation of South African States. He opposed the project, which consequently failed. On the occasion of the first conflict between the Transvaal and England, he was successful in bringing about peace negotiations between Sir Evelyn Wood and the Boer representatives.

BRANDE, WILLIAM THOMAS (1788-1866). An English chemist. He studied medicine, became a Fellow of the Royal Society, and assistant to Sir Humphry Davy, whom he succeeded in the chair of chemistry in 1813. From 1816 to 1836 he and Faraday were joint editors of the *Quarterly Journal of Science and Art*, and in 1853 he received the honorary degree of D.C.L. from Oxford. He was the author of several works. His manual of *Chemistry* (1819) is one of the best text-books of the time; but his fame rests chiefly upon his *Dictionary of Science, Literature, and Art* (1842).

BRAN'DEIS, FREDERICK (1835-99). An American organist and composer. He was born in Vienna, Austria, where he studied under Fischhof, Czerny, and Rufinatscha. In 1849 he traveled through the United States with the William Wallace Opera Company, and settled in New York City in 1851. He was organist of the Roman Catholic churches of Saint John the Evangelist (1865-70) and Saint James (1871-86), in New York; of Saint Peter and Saint Paul's Church, in Brooklyn (1886-98), and of the Forty-fourth Street Synagogue in New York (1886-98). His compositions include a prelude to Schiller's *Maria Stuart; The Sunken Cloister*, a ballad for chorus and orchestra; and many instrumental and vocal pieces. Of his songs, the best known is "My Love is Like the Red, Red Rose."

BRANDENBURG, brăn'den-bōōrk. The most populous province of Prussia, situated in the centre of the kingdom, and covering an area of 15,381 square miles, excluding the city of Berlin (Map: Prussia, E 2). It is very flat, and in some parts marshy, with a slight elevation toward the southeastern end. Brandenburg is exceptionally well watered both by natural rivers and lakes, as well as by canals. Among the chief rivers are the Oder, with its numerous tributaries, and the Elbe, with its navigable tributary the Havel. Lakes are very numerous, and some of them are connected by canals with the larger rivers. Brandenburg has a very sandy and sterile soil and it is only by artificial means that it has been made productive. The area under tillage is very extensive, and the chief cereals raised are barley and rye. Wheat and oats are raised in limited quantities, while potatoes are grown on a very large scale for distilling purposes. Tobacco is also an important agricultural product. The raising of cattle is carried on extensively and some wool is exported. The chief mineral product is brown coal, of which Brandenburg yields about 8,000,000 tons annually, and the mining of which gives occupation to over 10,000 men.

The manufacturing industries are developed to a very high degree. Brandenburg contains extensive silk, woolen, linen, and cotton cloth and yarn mills, and numerous establishments for the dyeing, spinning, and printing of different textiles. There are also machine-shops, cigar and cigarette factories, glass and chemical works. The production of spirits and beer is extensive, and the sugar-mills produce large quantities of beet-sugar. The manufacture of women's garments is a prominent branch of industry, and the gold, silver, and bronze wares of Berlin are famous. Brandenburg is exceptionally well provided with transportation facilities. Besides its several navigable rivers and excellent canal system, it has about 3900 miles of roads and over

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1900 miles of railway lines of standard gauge, mostly belonging to the State.

For administrative purposes, the province is divided into the two districts (*Regierungbezirke*) of Potsdam and Frankfort, Berlin forming a separate division. It sends 36 representatives to the Lower Chamber (*Abgeordnetenhaus*) of the Prussian Landtag, and 20 members to the German Reichstag. Since 1875 the Landtag of Brandenburg has had its seat in Berlin. (For further particulars as to local administration, see PRUSSIA, paragraph on Local Government.)

The population of the province in 1900 was 3,107,951, showing an increase of 10.14 per cent. for the period of 1895-1900. The population consists almost exclusively of German Protestants. Although a considerable number of the inhabitants are of French and Dutch extraction, they have been so completely assimilated that no trace is left of their foreign origin. The general tendency of the population to leave agriculture for manufacturing pursuits, so strongly marked in all the Prussian provinces, is especially pronounced in Brandenburg, where a large falling off in the agricultural population since 1882 is accompanied by a still larger increase in the manufacturing population. The seat of the administration is at Potsdam.

The various nations of Teutonic origin which inhabited Brandenburg at the beginning of the Christian Era were replaced during the age of migrations by a number of Slavic tribes, whom Charles the Great vainly attempted to subdue. Henry I. succeeded in exacting tribute from them, and Otho I. divided their country into three marks; but the Slavs were not fully overcome till the middle of the Twelfth Century, when Albert the Bear, who styled himself Margrave of Brandenburg (see BRANDENBURG, city), about 1140, established the supremacy of the Germans by peopling the region with colonists from Westphalia and the Netherlands. Under the successors of Albert the feudal authority of Brandenburg was extended over Pomerania, and territorial gains were made at the expense of Bohemia and Poland. Especially prosperous was the joint reign of the brothers John I. and Otho III. in the middle of the Thirteenth Century, in whose time the power of the nobles was greatly restricted and many cities were founded. From 1323 to 1411 the Margraviate was ruled by princes of the houses of Wittelsbach and Luxemburg, under whom it drifted into feudal anarchy, and declined decidedly in wealth and power. In the Golden Bull of the Emperor Charles IV. (1356) the Margrave of Brandenburg was recognized as one of the seven Imperial Electors. In 1411 Frederick of Hohenzollern, Burgrave of Nuremberg, became Margrave, and in 1415 was invested with the electoral dignity. Frederick and his successors crushed the nobility once for all, restored order, and extended the boundaries of their principality. The Reformation was introduced about 1540, and in the religious disputes of the succeeding period the Electors of Brandenburg were leading champions of the Protestant cause. The greatness of Brandenburg may be dated from 1618, when John Sigismund became, through marriage, Duke of Prussia. In spite of the disasters of the Thirty Years' War, Brandenburg-Prussia, under the energetic rule of the Great Elector, Frederick William (1640-88), rose to the position of a leading State in northern Europe. In addition to Brandenburg and East Prussia, his dominions embraced the eastern and larger half of Pomerania, and the former Sees of Halberstadt, Minden, and Magdeburg (all acquired in the Peace of Westphalia, in 1648), together with Cleves, Mark, and Ravensberg, in the region of the Rhine and Westphalia. Under his son and successor, the Elector Frederick III. (King Frederick I. of Prussia), this realm was transformed at the very beginning of the Eighteenth Century (1701) into the Kingdom of Prussia, into whose history the history of Brandenburg is subsequently merged. Consult: Fontane, *Wanderungen durch die Mark Brandenburg* (4 vols., Berlin, 1892); Haake, *Brandenburgische Politik und Kriegführung* (Kassel, 1896). See PRUSSIA.

BRANDENBURG (anciently, *Brennaborch* or *Brennabor*, from Slav. *Branibor*, *Branniy bor*, from *brani*, war, fight + *borŭ*, forest). A city in the administrative district of Potsdam, in the Prussian Province of Brandenburg, situated on the Berlin and Magdeburg Railway, about 37 miles west-southwest of Berlin (Map: Prussia, E 2). The river Havel divides it into two parts, Old and New Brandenburg, both surrounded with walls. On an island in the river there is a third quarter, containing the castle, cathedral, and an academy for young noblemen. The cathedral has a fine crypt, dating from the Eleventh Century. Brandenburg has an extensive industry in the manufacture of basket-ware, woolens, linen, hosiery, paper, leather, beer, etc. Boat-building is also carried on to a considerable extent. Population, in 1890, 37,817; in 1900, 49,263. Brandenburg became the seat of a bishopric as early as 949. From November 27 to December 5, 1848, Brandenburg was the seat of the National Assembly of Prussia.

BRANDENBURG, NEU. See NEU-BRANDENBURG.

BRANDENBURG, CONFESSION OF. A confession of faith prepared by order of John Sigismund, the Elector of Brandenburg, in 1614, with a view to reconciling the tenets of Luther with those of Calvin, and to terminating the disputes provoked by the Augsburg Confession.

BRANDES, brän'dĕs, CARL EDVARD COHEN (1847—). A Danish writer, born in Copenhagen. He has won distinction as brother of Georg Brandes, a dramatist. His best-known works are: *Lägemidler* ("Remedy," 1881); *Et Besög* ("A Visit," 1882); and *Under Loven* ("Under the Law," 1890).

BRANDES, GEORG MORRIS COHEN (1842—). The first of Danish critics by genius, and one of the great systematic critics of literature in modern times, worthy to rank with the Frenchmen Sainte-Beuve, Taine, and Brunetière. Even his books of travel are books of criticism, but it is with the wide currents of European thought that he concerns himself, rather than with any national achievements or with questions of formal æsthetics and technique. So his work, at a time of national segregation and bitterness, has been to preserve for the Danes a cosmopolitan intellectual horizon and a community of higher interests with the neighbors and kin from whose politicians Denmark has suffered. He was born in Copenhagen, of Jewish parents, studied at the university there, traveled for several years, taught at the University of Copenhagen (1872-

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77), lived for five years in Berlin (1877-82), and has since resided, as a public lecturer with a subscribed guarantee of $1000 a year, in Copenhagen. He wrote: *Æsthetic Studies* (1868); *French Æsthetics* (1869); *Criticisms and Portraits* (1870); *The Main Literary Currents of the Nineteenth Century* (1872-82). This was followed by *Danish Poets* (1877); *Ferdinand Lassalle* (1877, written in German); *Lord Beaconsfield* (1879, written in German); *Eminent Authors of the Nineteenth Century* (1882); *Men and Works in European Literature* (1883); *Berlin as an Imperial Court* (1884); *Impressions of Poland* (1888); *Impressions of Russia* (1888); *Essays* (1890). His most recent works are *Poems* (1899), and a remarkably fresh and sympathetic study of Shakespeare (1898), of which the English translation is in a second edition. Brandes is a scientific critic to whom literature is itself a 'criticism of life'—a disciple of Comte and Taine, of Mill and Spencer. Naturally, therefore, he has moved in an atmosphere of controversy which has itself tended to awaken the national mind, and has given to much of his work a sort of challenging boldness. His great work, the *Main Currents*, mentioned above, is in six volumes, and treats first of the French 'emigrant literature,' revived by contact with England and Germany, at the hands of Châteaubriand, Madame de Staël, and Sénancour. From this he passes to the German romantic school, thence to the French reaction, and to what he calls 'Naturalism' in England. This leads him directly to the French romanticists, and these to the so-called Young Germany of 1848, with which the work has rested, great though incomplete, for many years. The collected *Works* of Brandes are in course of publication (1900—). Many of his works have been translated into German, and some into French and English.

BRANDING (AS. *brand*, a burning, sword, Ger. *Brand*, a burning, brand). In mercantile law, the act of distinguishing goods by burning or stamping a peculiar mark into or upon them. In the case of manufactured articles, this practice has become a part of the matter of trade-marks. (See TRADE-MARK.) The branding of animals, especially on the great ranches of the West, is commonly resorted to.

In criminal law, a form of punishment employed in certain cases by the Greeks and Romans, and adopted by the Canonists and by our Anglo-Saxon ancestors. It was practiced to some extent by the early Colonists in the United States, but is now obsolete, both here and in Great Britain. See BENEFIT OF CLERGY.

BRANDIS, brän'dĭs, CHRISTIAN AUG. (1790-1867). A German philosophical writer. He was born at Hildesheim. He took part in the preparations for the great critical edition of the works of Aristotle, contemplated by the Berlin Academy of Science (5 vols., Berlin, 1831-36); and with this object spent several years, along with Immanuel Bekker (q.v.), in exploring the chief libraries of Europe. In 1821 he was called to the new University of Bonn, where he edited Aristotle's *Metaphysics* (Vol. I., Berlin, 1823); *Scholia in Aristotelem* (Berlin, 1836); and *Scholia Græca in Aristotelis Metaphysicam* (Berlin, 1837). He accepted in 1837 a call from the young King of Greece, and spent several years in that country as Cabinet Counselor. As a result, we have his *Mitteilungen über Griechenland* (3 vols., Leipzig, 1842). Other works of his are *Handbuch der Geschichte der griechisch-römischen Philosophie* (3 vols., Berlin, 1835-66) and *Geschichte der Entwickelung der griechischen Philosophie und ihrer Nachwirkungen im römischen Reiche* (Berlin, 1862-64).

BRANDIS, Sir DIETRICH (1824—). A German-English forester. He was born in Bonn, studied at the universities of Copenhagen, Göttingen, and Bonn, and in 1855 was appointed superintendent of the teak forests of Pegu. From that time until 1883 he was employed under the British Government in the care of the forests of Burma and India, having been from 1864 inspector-general of forests to the Indian Government. He has written monographs on the Indian forests, and completed L. Stewart's *Forest Flora of Northwest and Central India* (London, 1876).

BRANDL, ALOIS (1855—). A German Anglicist, born in Innsbrück. He studied English philology in Berlin and London, was made extraordinary professor at Prague in 1884, and ordinary professor at Göttingen in 1888, and at Strassburg in 1892. His principal work is *Samuel Taylor Coleridge und die Englische Romantik* (1886; English ed. 1887). He also contributed an interesting article on Middle-English literature to Paul's *Grundriss der Germanischen Philologie*. In 1892 he became associate editor of the work entitled *Quellen und Forschungen zur Sprache und Kulturgeschichte der Germanischen Völker*.

BRAN'DON. A city in Manitoba, Canada, founded in 1881, and now a large grain and lumber market, on the Canadian Pacific Railroad, below the junction of the Assiniboine and Little Saskatchewan rivers, 132 miles west of Winnipeg (Map: Manitoba, J 5). The town, in a pleasant and elevated situation, is substantially built, and has a court-house, a collegiate institute, a convent, banks, parks, a Government experimental farm, lofty grain-elevators, car-shops, and manufactures of flour and oatmeal, machinery, pumps, lumber, and ales and porter. Population, in 1891, 3778; in 1901, 5738.

BRANDON. A town in the county of Durham, England, 3 miles west-southwest of the city of Durham. It is an important mining town, with a considerable industry in coal and iron. Population (including the neighboring town of Byshottles), in 1891, 14,239; in 1901, 15,573.

BRANDSTETTER, bränt'stĕt-tĕr, HANS (1854—). An Austrian sculptor. He was born at Hitzendorf, near Gratz, and was a pupil of Hellmer, at the Academy of Arts, Vienna. His first works, "The Flight of Lot from Sodom," "The Flute-Player," and "Plato," were honored with the prize given by the Academy. Among his later productions the following are especially noteworthy: "The Forest Lily," a bronze statue (City Park, Gratz), "Prometheus," and "The Return of the Prodigal."

BRANDT, bränt, ENEVOLD, Count (1738-72). A Danish courtier. He was born in Copenhagen, and studied law at the university of that city. He became assistant judge of the Supreme Court of Copenhagen in 1764, Royal Chamberlain in 1769, and afterwards superintendent of the Royal

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Theatre. He acted as the companion of King Christian VII., but became involved in the catastrophe of January 17, 1772, and, together with his friend Struensee (q.v.), to whose advancement he had contributed, was condemned to death, his execution following on April 28, 1772.

BRANDT, Heinrich von (1789-1868). A Prussian general. He was born at Lakin, in West Prussia, and after pursuing legal studies in Berlin, entered the army as ensign in 1807. The Peace of Tilsit made him a subject of the Grand Duchy of Warsaw, and as such he fought in Spain and in the Napoleonic campaign in Russia. He was wounded in the battle of Leipzig and taken prisoner by the Russians, who forced him into the Polish Army. He entered the Prussian Army in 1816, and became a member of the General Staff. He was connected with the Polish insurrections of 1831 and 1848, the latter of which he helped to suppress. He retired from the army in 1857, with the rank of general of infantry. In 1849 he had been elected to the Prussian Upper Chamber, and in the following year he was a member of the Erfurt Parliament. He was the author of a number of works on military subjects, including *Geschichte des Kriegswesens* (Berlin, 1830-35); *Grundzüge der Taktik der drei Waffen* (Berlin, 1833); *Der kleine Krieg* (Berlin, 1850).

BRANDT, Heinrich Franz (1789-1845). A Swiss medal-coiner. He was born at La Chaux-de-Fonds, in the Canton of Neuchâtel. After a short apprenticeship he went to Paris, where in 1813 he was awarded the Grand Prix de Rome. In 1817 he was appointed chief engraver to the mint in Berlin, and in 1824 he became professor and member of the Academy of Fine Arts in that city. A complete catalogue of the medals designed by him may be found in the publications of the Berlin Academy for 1845.

BRANDT, Hermann Carl George (1850—). A German-American scholar, born at Vilsen, Germany. He graduated in 1872 at Hamilton College, was an instructor there in 1874-76, and from 1876 to 1882 was associate professor of German at the Johns Hopkins University. In 1883 he was appointed professor of German language and literature at Hamilton. His publications include a German-English and English-German dictionary; an edition (1879) of the *Nathan der Weise* of Lessing; a *German Grammar* (1884; several subsequent editions); and a useful *German Reader* (1889).

BRANDT, Josef von (1841—). A Polish painter, born at Szczebrzeszyn, near Warsaw. He at first devoted himself to engineering, and it was not until 1862 that he seriously took up painting under Piloty and Franz Adam in Munich. His subjects are taken principally from the military life of the Seventeenth Century, although several of his most charming productions deal also with the life of the Polish peasantry. The following is a partial list of his more important works: "Polish Peasants Before an Inn" (1870); "Episode from the Relief of Vienna" (1870); "Cossack Camp in Seventeenth Century" (1872); "Polish Fair" (1872); "Battle of Vienna in 1683" (1872); "Tartar Battle" (1878); "Critical Moment" (1884); "Cossacks Caught in the Snow in the Ukraine" (1885).

BRANDT, Marianne, family name Marie Bischof (1842—). A German operatic singer. She was born in Vienna, and was educated at the conservatory in that city. She first attracted attention as Recha in *La Juive*, and soon afterwards accepted an engagement in Gratz. After 1868 she was associated for many years with the Royal Opera in Berlin. In 1882 she went to New York, where she sang for several seasons in grand opera. Gifted with a rich contralto voice of extraordinary compass, and possessing exceptional histrionic gifts, Marianne Brandt was regarded, in her prime, as one of the greatest German contraltos of the century. As an admirable interpreter of Wagnerian rôles, she contributed largely to the success of the music festivals held in Bayreuth in 1876 and 1882.

BRANDT, Max August Scipio von (1835—). A German diplomat. He is the son of Heinrich von Brandt (q.v.), and was born in Berlin, October 8, 1835. After serving in the army, he was made in 1860 member of a diplomatic mission dispatched to the Far East. From 1862 to 1875 he was in Japan as the diplomatic representative, successively, of Prussia, of the North German Confederation, and of the German Empire. From 1875 to 1893 he was Minister at Pekin. He is author of *Aus dem Lande des Zopfes* (Leipzig, 1894); *Die Zukunft Ostasiens* (Stuttgart, 1895); *Sittenbilder aus China* (Stuttgart, 1895).

BRANDY (for older *brandywine;* cf. Ger. *Branntwein*, burned, distilled wine). A term sometimes applied generically to all kinds of ardent spirits, but usually restricted to the liquid obtained by distilling the fermented juice of the grape. (See Distilled Liquors, or Ardent Spirits.) The various fermented wines employed for this purpose contain from 10 to 25 per cent. of their weight in alcohol, the white wines being preferred, as they possess a finer flavor than red wines. The yield of 1000 gallons of wine is from 100 to 150 gallons of brandy. The liquor varies in strength, but is commercially judged of according to the quantity of *eau de vie* of brandy *à preuve de Hollande* which it contains. It is generally diluted with water until it consists of from 50 to 54 per cent. by weight of absolute alcohol. When distilled, brandy is clear and colorless, and will remain so if kept in glass vessels. But when placed in wooden casks, the spirit dissolves out the coloring matter of the wood, and acquires a light sherry tint, which dealers often make deeper by the addition of burnt sugar and other coloring matters. The pleasant aroma of brandy is due to the presence of more or less fusel oil (q.v.), accompanied by œnanthic ether. The most famous brandy is that known as Cognac, distilled in the departments of Charente and Charente-Inférieure, in the southwest of France. Because of the ravages of the Phylloxera insect, the manufacture of genuine Cognac has greatly decreased in France in recent years; while the manufacture of factitious Cognac has correspondingly increased. Brandy is also made in Spain and Portugal, and, within recent years, in California. A second-class brandy is obtained from the refuse (*marc*) of the grapes left in the wine-press, the scrapings of wine-casks and vats, and the deposits in wine-bottles. Very much of the brandy of commerce

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is a factitious product made from grain or potato spirit. In America, brandy is made not only from fermented grapes, but also from apples (see APPLE BRANDY), pears, cherries, and peaches. For the production of brandy in the United States, see LIQUORS, FERMENTED AND DISTILLED, STATISTICS OF. See also, DISTILLED LIQUORS; ALCOHOL; and ALCOHOL, PHYSIOLOGICAL EFFECTS OF.

BRANDY STATION. A village in Culpeper County, Va., about 56 miles southwest of Alexandria (population, in 1900, about 225), the scene of considerable fighting during the Civil War. Engagements between Federal and Confederate forces occurred here on August 20, 1862, when the Federals made a notable cavalry charge; on June 9, 1863, when the Confederate general, Stuart, at the head of a cavalry force of about 10,000, defeated a somewhat inferior force of Federal cavalry under Generals Pleasanton and Buford, the former losing 485 in killed, wounded, and missing, the latter, 907; on September 13, 1863, and on October 11, 1863. Various other skirmishes of minor importance were fought in this vicinity during the Chancellorsville and Gettysburg campaigns. The engagement of June 9, 1863, was of considerable strategic importance. It is often called the battle of Beverly's Ford.

BRAN'DYWINE', BATTLE OF. A battle fought at Chadd's Ford, on the Brandywine Creek, September 11, 1777, during the American Revolution, between about 18,000 British under General Howe, and about 11,000 Americans under General Washington. Half the British army under Lord Cornwallis attained the right flank of the Americans by a forced march of eighteen miles along the Lancaster Road, and drove back the American right under General Sullivan, while Knyphausen, with the other half, crossed at Chadd's Ford and forced the American centre and left, under Greene and Wayne respectively, back toward Dilworth and Chester. The Americans, though defeated, withdrew in good order, and the three divisions safely effected a junction at Chester. The American loss was estimated at about 1000, the British at about 600. Howe's victory enabled him to occupy Philadelphia, with little resistance, on the 26th, the Continental Congress adjourning first to Lancaster and then to York. Lafayette was severely wounded in this engagement. Consult Carrington, *Battles of the American Revolution* (New York, 1877).

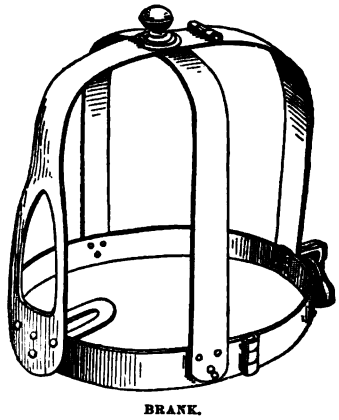
BRAN'FORD. A borough in a town of the same name, New Haven County, Conn., 8 miles southeast of New Haven, on Long Island Sound, and on the New York, New Haven and Hartford Railroad (Map: Connecticut, D 4). It has a good harbor for small craft and manufactures locks and malleable iron fittings. Oyster-culture and granite-quarrying also are important industries. The borough contains the Blackstone Memorial Library, a fine marble structure. Branford, originally called Totoket, was settled in 1643 by a company from Wethersfield, Mass., and another company, headed by Rev. Abraham Pierson (q.v.), from Southampton, L. I., and derived its name from Brentford, England. In 1667 most of the settlers, dissatisfied with the union of the Connecticut and New Haven Colonies, moved in a body to Newark, N. J., but others gradually came in and took their places. In 1685 Branford received its patent from the Colonies. The borough was incorporated in 1893. Population (town), in 1890, 4460; in 1900, 5706; borough, in 1900, 2473. Consult Lambert, *History of the Colony of New Haven* (New Haven, 1838).

BRANG'TONS, THE. The name of characters in the novel *Evelina*, by Miss Burney. They are a household in whom envy and spite are common characteristics.

BRANG'WAINE. The nurse of Yseult in the legend of *Tristan and Yseult*, modifications of which may be found in Matthew Arnold, Swinburne, and Tennyson. In Wagner's music drama of *Tristan und Isolde* the spelling is Brangäne. She is, originally, the 'Venus of the Northern Seas.'

BRANICKI, brä-nĭts'kē, JAN CLEMENS (1688-1771). A Polish hetman, a great-grandson of the celebrated Czarnecki, and the last of a distinguished line of nobles. After a period of service in the French Army he returned to Poland (1715), where he joined the league against Augustus II. He became successively starost, standard-bearer, hetman (1735), waywode of Cracow, and grand hetman; and upon the death of Augustus III. was invited to accept the crown of Poland. But the monarchical party represented by the Czartoryskis controlled the Polish Diet of 1764, and by their command Branicki was seized, deprived of his honors and dignities, and banished from the country. He fled to Hungary, but returned upon the accession of his brother-in-law, Poniatowski, to the throne, and thereafter lived in retirement.

BRANK (probably akin to Ir. *brancas*, halter, pillory, Dutch *pranger*, fetter), or SCOLD'S BRIDLE. An instrument formerly used in England and Scotland for the punishment of notorious scolds, and of women convicted of street brawling, or of insulting public officers. It was an iron framework which was placed on the head, inclosing it in a kind of cage. In front



BRANK.

was an iron plate, sometimes covered with spikes, which entered the culprit's mouth and prevented the use of the tongue. With this bridle on her head, the victim was led through the streets or chained to a pillory or market cross. On market days the instrument was exhibited in front of the house of the officer authorized to use it, as a warning to vixens. In some parts of Britain it continued to be used well into the last century.

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Its history is told and its various forms illustrated in Andrews, *Old-Time Punishments* (London, 1890). Consult also Earle, *Curious Punishments of Bygone Days* (Chicago, 1896).

BRAN'NAN, JOHN MILTON (1819-92). An American soldier. He was born in the District of Columbia; graduated at West Point in 1841, and in 1847, during the Mexican War, participated as first lieutenant in the various battles of the Southern campaign. In September, 1861, he was appointed brigadier-general of volunteers, and from January to March, 1862, commanded the Department of Key West. He served from June, 1862, to January, 1863, in the Department of the South, of which he was twice temporarily in command, and during this time commanded the Saint John's River expedition (September, 1862), and took part in the battle of Pocotaligo. During the Tennessee campaign of 1863 he commanded a division, participated in the battles of Chickamauga and Chattanooga, and from December, 1863, to May, 1864, was engaged in reorganizing the artillery of the Army of the Cumberland. From May to October, 1864, he took part in the invasion of Georgia, and after the capture of Atlanta arranged the artillery for the defense of that place. At the close of the war he was brevetted major-general of volunteers and both brigadier-general and major-general in the regular army, for 'gallant and meritorious services,' and subsequently served at various army posts, as lieutenant-colonel and colonel, until 1882, when he retired from active service.

BRAN'NER, JOHN CASPAR (1850—). An American geologist. He was born at New Market, Tenn., studied at Cornell University, and in 1875-77 was a member of the Imperial Geological Commission of Brazil. From 1882 to 1883 he was agent in Brazil for the United States Department of Agriculture, and from 1883 to 1885 Topographical Geologist of the Pennsylvania Geological Survey. He was appointed professor of geology at the University of Indiana in 1885; in 1892 was called to a similar chair at the Leland Stanford, Jr. University. From 1887 to 1893 he was State Geologist of Arkansas, and in his official capacity was an important factor in the development of the mineral resources of that State. In 1899 he directed a geological expedition to Brazil, and in the same year was appointed vice-president of the Leland Stanford, Jr. University. He is a member of many scientific societies in the United States and foreign countries, is associate editor of the *Journal of Geology*, and has made numerous important contributions to the *American Journal of Science*, and to the *Proceedings* of the American Philosophical Society and of the American Association for the Advancement of Science. Among his most important publications are: *Annual Reports of the State Geologist of Arkansas* (Little Rock, 1887-1901); "Cotton in the Empire of Brazil," *United States Department of Agriculture, Miscellaneous Special Reports* (1885); and "Bibliography of Clays and the Ceramic Arts," *United States Geological Survey Bulletin, No. 143* (1896).

BRANT (probably refers to the dark color, meaning something burnt; cf. *brand*). The name given to various species of goose of the genus Branta. The brants may be recognized by the black cheeks and chin taken in connection with the white patches or streaks on the sides of the neck. They are considerably smaller than the common wild goose, and fly less rapidly, in more compact groups, and without a chosen leader. The common brant (*Branta bernicla*) is found throughout the northern portions of the whole Northern Hemisphere. It breeds in the far north, well within the Arctic circle, but migrates southward in Europe and eastern North America on the approach of winter. The nest is made on the ground, from grasses, moss, etc., and is lined with feathers; the eggs are said to be creamy-white in color and only four in number. The brant, though occasionally seen in the interior of the United States, is chiefly marine, and is most abundant in shallow bays along the coast, rarely as far south as the Carolinas. It is rather sluggish in its movements, seldom taking to flight unless alarmed. It rises from the water slowly, and often returns to the same point whence it started, unless attracted by another flock. It feeds chiefly on vegetable matter, the so-called 'eel-grass' (Zostera) furnishing a large part of its diet. It pulls this at low tide, diving and tearing it up with its beak; and then, as the tide rises and it has to give up this method of work, it floats lazily on the water, enjoying the feast which it has earned. For the eel-grass, when pulled, floats, and so the bird can feed on it at leisure after the water is too deep for agreeable diving.

In the western part of the United States the common brant is replaced by the black brant (*Branta nigricans*), in which the lower breast and upper part of the belly are nearly as dark as the back. The black brant breeds with the common brant in the Arctic regions; but in migrating southward it resorts to the Pacific Coast and the Western States, and is rarely seen in the East. The name is sometimes given to other species of goose, and the common brant is often confused with the barnacle-goose (q.v.)—a very rare, accidental visitant in the United States. The snow-goose (q.v.) is sometimes called 'white brant,' but it is not properly a brant, which it resembles only in size. See GOOSE, and Plate of DUCKS (WILD.)

BRANT, JOSEPH (THAYENDANEGEA) (c.1742-1807). A celebrated Mohawk Indian chief. When very young he became a favorite of Sir William Johnson, who sent him to Dr. Eleazar Wheelock's school, at Lebanon, Conn., out of which later grew Dartmouth College. Here he obtained a fair education and joined the Episcopal Church, of which he remained a member throughout life. For some time he was a missionary among the Mohawk Indians, and he translated into their language the Prayer-Book and parts of the New Testament. He was early distinguished for his physical prowess, and rendered valuable services to the English in both the French and Indian and the Pontiac wars. In 1774 he became the secretary of Guy Johnson, superintendent of Indian affairs, and throughout the Revolutionary War he served against the Americans, leading numerous sanguinary raids, participating in the Cherry Valley and Minisink massacres, and taking an active part in the battle of Oriskany. He was not, however, present at the Wyoming massacre, as he is represented to have been in Campbell's *Gertrude of Wyoming;* and he seems, for the most part, to

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have treated his captives with great humanity, and to have steadfastly opposed, and, wherever possible, prevented torture. After the war he used his influence to preserve peace between the various Indian tribes and the whites. In 1786 he visited England, where he was entertained by many persons of prominence, and became acquainted with such men as Burke and Sheridan. With money collected on this trip he built the first Episcopal church erected in Upper Canada. John Fiske has said of Brant that he "was perhaps the greatest Indian of whom we have any knowledge," and that "certainly the history of the red men presents no more many-sided and interesting character." Consult: Stone, *The Life of Joseph Brant-Thayendanegea, Including the Indian Wars of the American Revolution*, new ed. (Albany, 1865).

BRANT, or **BRANDT**, brănt, SEBASTIAN (c.1458-1521). A German satiric poet and humanist. He was born in Strassburg, the son of a wealthy burgher. He studied philosophy and jurisprudence at the University of Basel, taught there, and rose to eminence through writings that induced Emperor Maximilian to make him Imperial Councilor and Count Palatine. He took an important part in negotiations with the Holy See. He is the author of *Das Narrenschiff* ("The Ship of Fools"), published in 1494, one of the most remarkable and popular books of the time. This work, as an artist, he illustrated himself, as well as editions of Terence (1496); Boëthius (1501); Vergil (1502); and a volume of sermons, *Quadragesimale* (1496). *The Ship of Fools* (Narrenschiff) is supposed to have suggested Erasmus's famous *Praise of Folly*, and was a sort of *Pilgrim's Progress* to its generation. It was a mirror to those perplexed times, and carried the spirit of the Reformation far beyond the borders of Germany, and into quarters where the writings of Luther would have found no hearing. It is thought to have been suggested by a passage in a chronicle which describes a carnival procession at Aix-la-Chapelle in the Twelfth Century. Here a ship was borne about the country, followed by a train of gayly-dressed men and women singing and dancing. Brant saw in this 'pagan worship,' as the chronicler calls it, the possibilities of a social satire. He invites to passage representatives of every class—the misers, the gluttons, the church-goers for show and the church-goers for respectability, the pedantic and the frivolous, "from beardless youth to crooked age," knights and ladies, cooks and butlers, gamesters, drunkards, spendthrifts, merchants, alchemists, and lovers, in motley and ever-changing throng. So all classes saw themselves in his picture, and read with a twinge at their own and a smile at others' folly, "the first printed book that dealt with contemporary events and living persons, instead of old German battles and French knights" (Max Müller). Contemporary writers made constant allusions to it; monks preached from its texts; three years after its appearance it was turned into Latin by Locker, fifteen years after into English by Barclay (London, 1509), and again by Henry Watson, as *The Grete Shyppe of Fooles of the Worlde* (1517). This has been edited by Jamieson (Edinburgh, 1874). The best German editions are by Zarncke (Leipzig, 1854), with an extensive commentary, and by Goedecke (Leipzig, 1872).

BRANT'FORD. The chief city of Brant County, Ontario, Canada, on Grand River and the Grand Trunk Railroad, 70 miles east of London (Map: Ontario, C 4). The river is navigable to within 2½ miles of the town, whence a canal connects it with Lake Erie. The city has fine public buildings, chiefly of white brick; gas and electric lighting, many churches of architectural beauty, large railroad shops, factories of brass and iron castings, engines and mill machinery, and stoneware, several branch banks, the Ontario Institution for the Education of the Blind, and Wickliffe Hall. The United States has a consular agent here. The city was named after the famous Mohawk chief Brant, to whom a fine monument was erected in Victoria Square. Brantford is the headquarters of the amalgamated tribes of the Six Nations. Population, in 1891, 12,753; in 1901, 16,631.

BRANTÔME, brăn'tôm', PIERRE DE BOURDEILLES, Abbé de (c.1540-1614). A French courtier and chronicler. He was born in Périgord, and as the third son of a nobleman he was dedicated in youth to the Church; but presently became a page of the liberal and literary Margaret of Navarre (q.v.). On her death (1549) he studied in Paris, served Francis of Guise, and became gentleman of the chamber to Charles IX. Then, with the exception of time spent in diplomatic missions, of which the escort of Mary Stuart to Scotland is noteworthy for the fine description that he gives of it, and in campaigns and traveling for pleasure, he passed his life at the courts of Henry III. and IV., till his retirement to his ancestral estate (1594). Here lawsuits with monks and neighbors occupied his last years, and he relieved himself from the ennui they caused by reminiscent memoirs, *Vies des hommes illustres et des grands capitaines français; Vies des dames illustres; Vies des dames galantes; Anecdotes touchant les duels; Rodomontades et jurements des Espagnols;* a *Life* of his father; a funeral oration on his sister-in-law; and some insignificant verses. His MSS. were not printed till 1665. The best of many editions is by Lalanne, 10 vols. (1865-81). Brantôme recognizes only two social essentials—to be born an aristocrat and to hate Huguenots. Indifferent to honor and morality, he is an impartial witness to the vice and crime of his epoch. None has mirrored more truly the Valois Court or its moral ideals. Consult Lalanne, *Brantôme, sa vie et ses écrits* (Paris, 1897).

BRAS'DOR'S OPERATION. It is stated in the article ANEURISM that a cure is effected in that disease by successive layers of the fibrin of the blood being deposited in the aneurismal sac. It was suggested by Brasdor that the course of the blood should be impeded by a ligature upon the artery beyond the aneurismal sac. A modification of this operation, known as Wardrop's operation, is used in suitable cases. It was named after an English surgeon, Brasdor, who, in 1826, first performed the operation successfully. Consult Park, *Surgery by American Authors*, 3d ed. (New York and Philadelphia, 1901).

BRASE'NOSE COLLEGE. A college at Oxford, England, founded about 1509 by William Smith, Bishop of Lincoln, and Sir Richard Sutton—the last of the pre-Reformation colleges. The name is said to have come from *Brassen-*

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hus (brew-house), a building which previously stood on the site; and the corruption becomes at once facetious and plausible from the significant knocker, in the form of a brazen nose, which hangs over the old entrance. The new buildings on the High Street are among the best examples of modern collegiate architecture. The college can receive 150 undergraduates. Among its members have been Burton (author of the *Anatomy of Melancholy*), Ashmole (founder of the Ashmolean Museum), Foxe (author of the *Book of Martyrs*), Bishop Heber, Dean Milman, Barham (author of the *Ingoldsby Legends*), and Roberston, of Brighton. Here, too, Walter Pater was tutor. Besides good standing as a college, Brasenose has been fortunate in her athletics, particularly boating.

BRASHEAR (brăsh'ĕr) **CITY.** See MORGAN CITY.

BRAS'IDAS (Gk. Βρασίδας). A distinguished Spartan general of the Fifth Century B.C., especially notable for his courageous conduct in the Peloponnesian War. For his successful defense of Methone, in Messenia, he was made a chief magistrate of Sparta. He brought relief in 424 to Megara, and, marching through Thessaly, subdued a number of Macedonian cities. Under great disadvantages he won, in 422, a signal victory over Cleon at Amphipolis, but both generals were mortally wounded. He was buried within the walls of Amphipolis, and, long honored as a hero, his memory was celebrated in games and sacrifices. To his worth his enemies bear witness: Thucydides extols his civic virtues, and Plato mentions him with Achilles.

BRASS (AS. *bræs*, probably related to Icel. *brasa*, to harden by fire, Sw. *brasa*, to fire). An alloy of copper and zinc, considered the most important of all alloys. It was distinctly known to the ancients, as shown by its mention in the Old Testament and in the works of Pliny; though, according to some authors, the alloy of the ancients was a variety of bronze, or a mixture of copper and tin. Natural brass was early used and was known as *orichalcum*. During the Middle Ages brass was made in Germany, chiefly in sheets, which found extensive use in churches. The original method for its production, called the *cementation process*, was by heating copper in the form of shot or sheet in crucibles in contact with zinc, or as calamine and carbon, resulting in the volatilization of the zinc, and its subsequent absorption by the copper. The brass thus obtained was melted down and cast. In 1781 a process for the direct production of brass from copper and zinc was patented by James Emmerson, whose method has since entirely superseded the old process, owing to its greater simplicity. Emmerson's method consists essentially in first melting the copper in a crucible, then adding the zinc in small quantities, and stirring until the two metals are thoroughly mixed, after which the molten brass is cast into molds of sand or iron. Brass has a fine yellow color, which becomes darker as the proportion of copper is increased, and is capable of receiving a fine polish. It is harder than copper, and hence better adapted to resist wear. Brass is both malleable and ductile, and therefore may be rolled into thin sheets or drawn into fine wire. It resists the influence of the atmosphere better than copper, but tarnishes if not protected by a lacquer or varnish. Brass comes into commerce chiefly as cast, sheet, wire, and tubes. The proportions of its two constituents vary from 10 parts of copper and 1 of zinc, forming a reddish-yellow brass, all the way to 1 part of copper and 5 parts of zinc, forming a very dark gray alloy. The composition of brass is regulated with a view to the purpose for which the alloy is to be employed. The proportions of the more important kinds are as follows: *Button brass*, 8 parts copper with 5 parts zinc; *fine brass*, 2 parts copper with 1 part zinc; *fine casting brass*, 90 parts copper, 7 parts zinc, 2 parts tin, and 1 part lead; *gilding brass*, 64 parts copper, 32 parts zinc, 3 parts lead, 1 part tin; *malleable brass*, 3 parts copper with 2 parts zinc; *soldering brass*, 12 parts fine brass, 6 parts zinc, 2 parts lead; *wire brass*, 72 parts copper, 28 parts zinc. Some of the most important kinds of brass have special names; thus, *Aich's metal* is brass composed of 60 parts copper, 38.2 parts of zinc, 1.8 part iron; *bath metal* is 5 parts of copper and 1 part of zinc; *Bristol brass*, 61 parts of copper, 39 parts of zinc; *oroide*, or *French gold*, 9 parts copper, 10 parts zinc; *Mannheim gold*, 2 parts of copper, 1½ parts zinc; *Muntz's metal*, 19 parts copper and 12 parts zinc; *Pinchbeck*, 88.8 parts copper, 11.2 parts zinc; *Prince's metal*, 75 parts copper and 25 parts zinc; *similor*, from 6 to 9 parts of copper with 1 part of zinc. An excellent brass solder consists of equal parts of copper and zinc, 1 part of silver being added for finer kinds of work.

BRASS, SALLY. A character in Dickens's *Old Curiosity Shop*, who delighted in starving the Marchioness. She was an abler scoundrel than her brother, and affected masculine ways and attire. She and Dick Swiveller struck up a curious negative sort of friendship.

BRASS, SAMPSON. The brother of Sally Brass in *The Old Curiosity Shop*, by Dickens. He was Quilp's legal tool, and could either bully or cringe, as occasion required. His attempt to ruin Kit, however, resulted in his own and his sister's downfall.

BRAS'SARTS (Fr. *brassart*, from *bras*, arm, Eng. *brace*). Parts of plate armor used to protect the upper part of the arms, and to unite the shoulder and elbow pieces. When the front of the arm only was shielded, the pieces were called demi-brassarts. Brassarts was sometimes used to designate the whole protection for the arm.

BRASSES, SEPULCHRAL. Flat tombstones of metal used generally during the Thirteenth and following centuries. They were set in the pavements of churches, and were made of brass or of a mixed metal called *latten* (Fr. *laiton*), the design being marked by incised lines in the metal, filled in with a black or dark resinous enamel. The brilliancy of the metal was sometimes enhanced by gilding and damascening. These sepulchral slabs were of two classes: (1) Marble or stone slabs to which the brass ornamentation was attached as to a ground, the brass forming the figure of the deceased in the centre of the slab, as well as the ornaments, framework, armorial bearings, and inscription, each inserted as a separate piece of metal into

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cuts (or casements) made in the stone ground. (2) Slabs entirely of metal, which appear to be of a single piece, but are really composed of several sheets carefully joined, and decorated in the same style as the first class. Such brasses were used almost exclusively in England and Flanders, very seldom in Germany and northern France, not at all in Italy. Those of the first class alone were common in England; those of the second, which were far rarer, more artistic and expensive, are found mainly in Flanders, where they were produced as late as the Seventeenth Century, and they alone have the rich, detailed ornamentation in damascened work. The works of this sort in France have been barbarously destroyed. In England many remain. There the earliest are among the most artistic; those of Sir John d'Aubernoun, at Stoke Dabernon (1277); of Sir Roger de Trumpington, at Trumpington (1289); and of Sir Richard de Buslingthorpe, at Buslingthorpe (1290), all very similar in style. More advanced Gothic is the 1325 slab of Sir John de Creke, at Westley Waterless. England probably owed most of such works to artists from Flanders, the north of France, and Burgundy. Among the fine sepulchral brasses in the Cathedral of Bruges, that of Sire Martin de la Chapelle (1452) is a beautiful example of the damascened work. There is a close relation between the sepulchral brasses and other and earlier kinds of work, especially the bronze church doors of Byzantine art in which the design was made out in the same way by incised lines filled with enamel (see DOOR), and also the plain marble funeral slabs, common throughout Europe, especially Italy, where the design was similarly outlined. (See TOMB.) In a few cases the brasses were not set flush with the pavement, but were either set up vertically against the wall or raised on a basement like a simple cenotaph. They must not, then, be confounded with sepulchral monuments in cast bronze.

BRASSEUR DE BOURBOURG, brä'sĕr' de bōōr'bōōr', CHARLES ETIENNE, Abbé (1814-74). A missionary and archæologist. He was born in Bourbourg, France, came to the United States in 1846 and was for a time Catholic Vicar-General at Boston. Two years later he entered upon his missionary labors in Mexico and Central America, which continued in connection with his studies of the ancient civilizations of that region until 1864, in which year he served as archæologist to the French expedition to Mexico. His numerous published works were compiled from materials gathered in the field and from studies of ancient manuscripts in the archives of Madrid. Besides his monumental *History of the Civilized Nations of Mexico and Central America During the Centuries Anterior to Christopher Columbus*, published in Paris, 1857, he is the author of numerous linguistic, archæological, and historical works relating to the same region.

BRAS'SEY, THOMAS (1805-70). An English surveyor, widely known as a railway promoter of great capacity and enterprise. At the age of 16 he became apprentice to a surveyor, who later set him up in business. His first railway contract was for a portion of the Grand Junction; then he completed the London and Southampton, with contracts involving $20,000,000. In 1840, with a partner, he built the railway from Paris to Rouen, and was concerned in five other French lines, and as many in England. The capital involved in his contracts at this period was equal to $180,000,000. He also built railways in Holland, Prussia, Spain, and Italy, and then undertook the Grand Trunk of Canada, 1100 miles in length, with the great bridge over the Saint Lawrence at Montreal. Subsequently his laborers were found in almost every country in Europe, India, Australia, and South America. He was generous, modest, and simple in his tastes and manners. Though undecorated at home, he received the cross of the Legion of Honor from France, the Order of Saint Maurice and Saint Lazarus from Victor Emmanuel, and the Iron Cross (the first time it was given to a foreigner) from Austria.

BRASSEY, THOMAS, K.C.B., first baron (1836—). An English politician, son of Thomas Brassey, mentioned above. He was born at Stafford, England, and was educated at Rugby and at University College, Oxford, graduating with honors. He was elected to Parliament for Devonport in 1865, represented Hastings from 1868 to 1886; was appointed civil lord of the admiralty in 1880, and became secretary to the admiralty in 1884. In Parliament he supported or agitated measures to reform labor laws, naval administration, agriculture, etc. In 1886 he offered himself as a Gladstonian Liberal for one of the divisions of Liverpool, but was defeated, and when Mr. Gladstone's Cabinet resigned, he was raised to the peerage. He has written *Work and Wages* (1872); *The British Navy* (1882-83); *Lectures on the Labor Question* (1878), etc. Since 1895 he has been Governor of Victoria. His wife, Lady Anne (Allnutt) Brassey, accompanied him on his journey around the world and published *The Voyage of the Sunbeam* (1877); *Sunshine and Storm in the East* (1878); *The Trades, the Tropics, and the Roaring Forties* (1884). She died at sea, 1887.

BRAS'SICA. See CABBAGE.

BRATH'WAITE, RICHARD. An English poet (1588-1673); educated at Oxford and Cambridge; lived in London and Westmoreland, his native shire. Among his numerous volumes of verse are: *The Golden Fleece* (1611); *The Poet's Willow*, pastorals (1614); *A Strappado for the Devil*, satires (1615); *Nature's Embassy*, odes and pastorals (1621); and the long popular *Barnabee's Journal* (1638), in English and Latin doggerel, famous for the Puritan who hanged his cat on Monday for killing a mouse on Sunday. See *Barnabee's Journal*, ed. Hazlitt (London, 1876).

BRATIANU, brä-tē-ăn', JOAN (1822-91). A Rumanian statesman. He was born at Pitesci and studied in Paris, where he took an active part in the student gatherings and republican manifestations which preceded the Revolution of 1848. Soon after his return to Bucharest he became one of the active instigators of the revolution which led to the deposition of the hospodar, George Bibesco. His radicalism and his prominence in the Provisional Government led him to advocate independence and oppose all schemes which had for their aim the placing of Wallachia under a Russian protectorate. In the same year, when repressive steps were taken by Russia and Turkey, he was seized, with several other leaders

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of the revolutionary party, and for fifteen days retained as a prisoner upon a miserable bark on the Danube. Condemned to exile, he returned to Paris, where he remained until the affairs of the Danubian principalities had been adjusted in the Peace of Paris (1856). Upon the accession of Prince Charles of Hohenzollern to the Rumanian throne, Bratianu became Minister of State, but was compelled to resign in 1868. Reinstated in 1876, he entered into an alliance with Russia against Turkey in 1877, proclaimed the independence of Rumania, May 21, 1877, and its establishment as an independent kingdom, March 26, 1881. In 1888 he resigned as President of the Ministry, his fall being largely due to the intrigues of his brother Demeter, who succeeded him.

BRATSCHE, brät'she. See MUSICAL INSTRUMENTS.

BRAT'TICE (OF. *bretesche, breteche;* Ger. *Bret*, AS. *bred*, board, plank). The term applied to a transverse partition of plate-iron or other suitable material set in the gangways of mines, to guide the ventilating air-currents through the proper passages.

BRATTLEBORO, brät't'l-bŭr'ō. A village, in a town of the same name, in Windham County, Vt., on the Connecticut River, 60 miles north of Springfield, Mass., and on the Boston and Maine and the Central Vermont railroads (Map: Vermont, D 10). It has a picturesque site, and contains a fine public library and the State Asylum for the Insane. The principal manufactures include children's carriages and toys, and organs, the factory of the Estey Organ Company being located here. Brattleboro was chartered in 1753 and derives its name from William Brattle of Massachusetts, one of the original grantees. Population, in 1890, 5467; in 1900, 5297. Consult Burnham, *Brattleboro (Vt.): Early History with Biographical Sketches* (Brattleboro, 1880).

BRAT'TON, HENRY DE. See BRACTON.

BRAUN, broun, ALEXANDER (1805-77). A German botanist. He was professor of botany in the universities of Freiburg, Giessen, and Berlin, successively, and was director of the Berlin Botanical Garden. He carried out numerous researches, chiefly on the morphology of plants. Among his works are: *Betrachtungen über die Erscheinung der Verjüngung in der Natur, insbesondere in der Lebens- und Bildungsgeschichte der Pflanzen* (1851), a treatise on the lower cryptogams, and *Beitrag zur Kenntnis der Gattung Selaginella* (1865).

BRAUN, AUGUST EMIL (1809-56). A German archæologist, born in Gotha. He studied in Göttingen, Munich, and Berlin. With Gerhard he went to Rome in 1833, and in a short time was made librarian, and subsequently secretary to the Archæological Institute. Later he founded there a galvano-plastic establishment, from which issued many reproductions of antique art objects and casts of modern works. Among his many valuable works on art may be mentioned *Il giudizio di Paride* (1838); *Kunstvorstellungen des geflügelten Dionysos* (1839); *Griechische Götterlehre* (1851-55); *Vorschule der Kunstmythologie* (1854), translated into English by Grant (1856); and an admirable guidebook, *Die Ruinen und Museen Roms* (1854), translated into English, 1855.

BRAUN, JULIUS (1825-69). A German archæologist. He was born in Karlsrühe and studied at the universities of Heidelberg and Berlin. At first a lecturer in the University of Heidelberg, he afterwards went to Tübingen, and finally to Munich, where he lectured in the Academy of Arts. Both in his books and in his lectures he maintained the thesis that the really fundamental principles of art and religion were derived from the Egyptians, and were transmitted, through the Semites, Greeks, and Romans, to the Germanic and other northern peoples. The following are some of his more important publications: *Studien und Skizzen aus den Ländern der alten Kultur* (1854); *Geschichte der Kunst in ihrem Entwicklungsgange, etc.* (1873); *Naturgeschichte der Sage* (1865); *Historische Landschaften* (1867); *Gemälde der mohammedanischen Welt* (1870).

BRAUN, KARL (1822-93). A German statesman and author. He was born at Hadamar, in the Duchy of Nassau, and studied classical philology and history at Marburg, and law and political economy at Göttingen. He was president of the Nassau Chamber of Deputies from 1859 to 1866, and as the leader of the Liberals advocated German unity and industrial freedom. He was one of the founders of the *Volkswirtschaftlichen Kongress*, and was elected its permanent president in 1859. In 1863 he established the *Vierteljahrschrift für Volkswirtschaft und Kulturgeschichte*—the representative organ of the Free-Trade Party of Germany—and edited this publication until 1887. As a deputy in the Reichstag he was successively identified with the National Liberal, Secessionist, and German Liberal parties. He published a great variety of works, among which the volumes entitled *Bilder aus der deutschen Kleinstaaterei* (1881) probably take first rank.

BRAUN, KASPAR (1807-77). A German wood-engraver. He was born at Aschaffenburg, and studied engraving in Munich and in Paris. In conjunction with Dessauer he established a xylographic institute in Munich in 1839. He became associated with Friedrich Schneider in 1843, and established the humorous publication *Fliegende Blätter*. Among the numerous works to which he has contributed engravings are the following: *Das Nibelungenlied*, after the drawings of Schnorr and Neureuther; *Volkskalender*, with illustrations after Kaulbach and Cornelius; *Göttz von Berlichingen;* and *Münchner Bilderbogen*.

BRAUN, LOUIS (1836—). A German painter of battle scenes. He was born at Schwäbisch Hall, Württemberg, and was educated in Munich and in Paris. He followed as an illustrator the Austrian army during the Danish War of 1864 and painted several battle scenes for the Emperor of Austria. He also accompanied the German armies in the war of 1870-71, and as a result exhibited his pictures entitled "Entry of the Mecklenburg Troops into Orleans," "The Capitulation of Sedan," "The Battle of Sedan" (later exhibited at Frankfort-on-the-Main and elsewhere as a panorama), "The Germans in Versailles," and "The Entry of the German Army into Paris." The great success of the "Battle of Sedan," in panoramic form, in-

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duced Braun (who in 1902 held a professorship in Munich) to produce several other works of the same description. Among these are the "Battle of Mars la Tour" (1884); "Panorama of the German Colonies" (with Petersen, 1885); and the "Battle of Lützen" (1892).

BRAUNE, brou'ne, CHRISTIAN WILHELM (1831-92). A German anatomist. He was born in Leipzig, and studied at the universities of Göttingen and Würzburg. In 1872 he became professor of topographical anatomy at the University of Leipzig. In his scientific investigations, Braune devoted himself particularly to the mechanical physiological side of anatomy, particularly as regards the movements of the joints and the equilibrium of the body in their bearing upon the equipment of the infantry. He also introduced dissection of frozen corpses into the technique of anatomy. Among his numerous works are the following: *Topographisch-anatomischer Atlas, nach Durchschnitten an gefrorenen Kadavern* (1872); *Du Lage des Uterus und Fötus am Ende der Schwangerschaft nach Durchschnitten an gefrorenen Kadavern* (1873); *Das Venensystem des menschlichen Körpers* (1884-88). In collaboration with His, he edited, after 1876, the *Archiv für Anatomie und Entwickelungsgeschichte.* He was also instrumental in securing the publication of the musical works of Frederick the Great.

BRAUNE, THEODOR WILHELM (1850—). A German philologist, born in Grossthiemig, Saxony. He graduated at the University of Leipzig, and afterwards served as professor of the German language and literature at the universities of Leipzig, Giessen, and Heidelberg. His published works include: *Beiträge zur Geschichte der deutschen Sprache und Litteratur* (1874-91); *Neudrucke deutscher Litteraturwerke des 16ten und 17ten Jahrhunderts* (1876); *Althochdeutsches Lesebuch* (1888).

BRAUNSBERG, brouns'bĕrk (earlier *Brunsberg*). A town of East Prussia, in the administrative district of Königsberg, about 35 miles southwest of the city of that name (Map: Prussia, J 1). It is situated on the Passarge, five miles from its junction with the Frische Haff. It contains a Catholic seminary and gymnasium, and the Lyceum Hosianum founded by Bishop Hosius in 1568. It has a large number of manufactories, the principal articles being soap, leather, and feltware. It has also a trade in grain and flax. It has regular steamship communication with Pillau and Königsberg. The town was founded about 1251 by the Teutonic Knights. It has belonged to Prussia since 1772. Population, in 1890, 10,851; in 1900, 12,497.

BRAURO'NIA. A festival in honor of Artemis, celebrated at intervals of four years at Brauron, when Attic girls between 5 and 10 years of age were consecrated at the sanctuary of Artemis. A part of the rite consisted in the imitation of the actions of bears by the girls. According to tradition, this rite originated in a plague sent upon the Athenians by Artemis in punishment for the killing of a bear which had torn a little girl in pieces. To propitiate the goddess, the rite was instituted, and all Attic women were obliged to take part in it before they were permitted to marry.

BRAUWER, brou'ĕr, or **BROUWER,** ADRIAN (c.1605-38). A Flemish artist. He was born in Haarlem, and studied under Frans Hals. The laughing faces that look out from his canvases remind one of that master's work. He also excelled in reproducing the grotesque and hideous in a human countenance. He produced several paintings of small interiors and some landscapes. He was dissipated and died young, and his pictures, for their scarcity, are doubly valuable. It is said that when Hals recognized the talent of his pupil, he made him work under lock and key and sold his paintings for good prices. By the advice of Adrian van Ostade, Brauwer ran away. With the price of a picture, sold in Amsterdam, he plunged into dissipation and neglected his work. At one time, while subjected to imprisonment for attempting to reach Antwerp without a passport, he obtained colors and painted a picture which Rubens recognized as the work of Brauwer. He was liberated, but bad habits soon ended his career. Rubens had him interred in the Church of the Carmelites. Brauwer reveled in painting the riotous scenes in which he himself took part. In the Munich Gallery may be found the following of his works: "Peasants Playing Cards," "Spanish Soldiers Throwing Dice," and another, the best of this class, "Card-Players Fighting." Consult: Buxton and Poynter, *German, Flemish, and Dutch Paintings* (London, 1881); Clement, *Painters, Sculptors, Architects, and Engravers* (Boston, 1899).

BRAVA'S (brä'vaz) **KNIGHT.** The name of Orlando Furioso, as the Marquis of Brava.

BRAVE BOYS ARE THEY. A Civil War song by Henry Clay Work.

BRAVEST OF THE BRAVE, THE. The title bestowed by the French King Henry IV. on his general Crillon, who was also styled 'the Fearless.' To Marshal Ney, also, the surname was given by Napoleon in 1807.

BRAVI, brä'vê (It. plur. of *bravo,* brave). Originally, the retainers of a noble house, and the champions of its quarrels. Later the bravi were wont to offer their services to any one for money. The internal history of Italy for many centuries is replete with the actions of these men, who in time became nothing more than hired bandits and assassins. In a more favorable sense, *bravo,* the singular of bravi, was applied to the dueling, love-making, sonnet-writing, and stabbing type of gentleman that flourished amid the lax morality of the Renaissance.

BRAVO, brä'vô, THE. The title of a novel by James Fenimore Cooper (1831). Upon it was based a drama by J. B. Buckstone (1833).

BRAVO-MURILLO, brä'vô-mōō-rē'lyô, JUAN GONZALEZ (1803-73). A Spanish statesman. He studied theology for a time, was afterwards a lawyer in Seville, and then became the editor of the first law journal in Spain, the *Boletin de Jurisprudencia,* founded by him and Pacheco in Madrid in 1835. With others he also established later the conservative papers *El Porvenir* and *El Piloto.* In 1837, and again in 1839, he was a leading member of the Cortes, but was proscribed after the Revolution of 1840, and took refuge in France. He returned in 1843 on the downfall of Espartero, was a member of the Ministry in 1847, and on the resignation of Narvaez in 1851 formed a new Cabinet, but resigned as Prime Minister in 1852, after having pursued a

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reactionary policy. The Revolution of 1854 caused him to leave Spain again, but he was recalled by Narvaez in 1856, and afterwards was intrusted with several important diplomatic missions.

BRAVURA, brä-vōō'rä (It., bravery, spirit, dash). A term which, applied to a musical composition, means that the music is written in a dashing, brilliant style, full of ornamentation and colorature that put to a severe test the abilities of the performer. Such compositions are often written to display the power, volume, or flexibility of a voice or the digital facility, power, and endurance of an instrumental performer. In the early part of the Nineteenth Century the excessive liberties taken by singers in improvising trills and runs to exhibit their voices induced Rossini to write out the bravura passages in his works so as to insure them against disfigurement by tasteless singers. It was owing to these latter that bravura fell into discredit. That it can be united with true artistic merit, the works of Mozart, Beethoven, Weber, Mendelssohn, Chopin, and others give abundant proof.

BRAWE, brä've, JOACHIM WILHELM, Baron von (1738-58). A German dramatist, born in Weissenfels (Saxony). He studied at the University of Leipzig, and was appointed to the Government board in Merseburg, but died before he had taken office. His *Der Freigeist*, a tragedy, influenced by Lessing's *Miss Sarah Sampson*, and *Brutus*, among the first German dramas to be written in unrhymed iambic pentameter, both gave evidence of unusual poetic talent. They were edited by Ramler and Lessing (Berlin, 1767). Consult: Sauer, *Brawe, der Schüler Lessings*, in Ten Brink and Scherer, *Quellen und Forschungen zur Sprach- und Kulturgeschichte der germanischen Völker*, Vol. XXX. (Strassburg, 1878).

BRAWLING (OE. *braulen*, to quarrel, boast, *brallen*, to cry, make noise, Ger. *prahlen*, Fr. *brailler*, to cry, shout). As a criminal offense, the creating of a disturbance in a consecrated building or inclosure. This was considered a heinous offense both by the ecclesiastical and the common law of England, "as being a very great indignity to the Divine Majesty, to whose worship and service such places were dedicated." By the Brawling Act of 1860 (23 and 24 Vict. c. 32, §2), any person guilty of riotous, violent, or indecent behavior in a church, chapel, churchyard, or burial ground, is liable to a fine of not more than five pounds, or to imprisonment for not more than two months. In the United States similar acts are punishable, generally, as affrays or breaches of the peace. See AFFRAY; BREACH; and the authorities referred to under CRIMINAL LAW.

BRAX'TON, CARTER (1736-97). An American patriot, one of the signers of the Declaration of Independence. He was born in Newington, Va., of wealthy parents, and was educated at William and Mary College. From 1761 to 1771 he was a member of the House of Burgesses, and, as such, took an active part in all the disputes with the royal Governors, and in 1765 strongly advocated the adoption of Patrick Henry's Stamp Act resolutions. He was a member, also, of the conventions which met in Williamsburg (August, 1774) and in Richmond (July, 1775), and served as a delegate to the Continental Congress from December, 1775, to August 11, 1776, during which time (on August 2) he signed the Declaration of Independence. Afterwards he was frequently elected to the House of Delegates and was twice a member of the Council of State. He was a representative of the 'aristocratic party' in Virginia, and by his views with regard to the organization of a new government—notably those in his *Address to the Convention of Virginia on the Subject of Government* (1776)—gave considerable offense to the more radical members of the patriot party. Consult Sanderson, *Biography of the Signers of the Declaration of Independence* (5 vols., Philadelphia, 1829).

BRAX'Y, BRAK'SY, BRAX'ES, BRAX'IT, or **BRACKS** (Scotch, origin unknown). Terms synonymously used to designate several different diseases in domestic animals. They are perhaps most correctly applied to a disease of sheep, which has also been called 'the sickness' in some parts of Scotland, 'Braasot' in Norway, 'Maladie subite du mouton' in France, and 'Louping ill' in Scotland and England. This disease appears as an epizoötic, and is due to the action of a pathogenic organism similar to that of blackleg. The Braxy bacterium rapidly loses its virulence in cultures and does not develop in the presence of oxygen. Contagion seems to play an unimportant rôle in the spread of braxy. The germs exist in the soil of infested localities and are taken into the stomach along with the fodder. The disease appears in the autumn, becomes most prevalent in winter, and usually disappears in spring, being but rarely seen in summer. Sheep from one to three years of age are most susceptible to its attacks. The animal in full health suddenly ceases to eat, has a staring look, is peculiarly excitable, and separates itself from the flock. The head is lifted high, the breathing becomes labored, the countenance appears anxious, and the animal loses the power of its limbs. It totters, falls over, is seized with convulsions, and dies within five or six hours, and often within an hour from the first symptom of the disease. Tumors are frequently developed on the neck and shoulders. If the sheep's throat is cut before it dies, the absence of any peculiar appearances within the body is very remarkable; the flesh appears of a dark-red color, and the veins are charged with dark blood, but, on the whole, the body of the sheep looks so well that the mountain shepherd cuts it up to make 'braxy mutton,' which has a fetid odor. If the sheep is allowed to die of itself, the body soon swells, putrefies, and is rendered useless. It is doubtful whether the meat should ever be eaten. The principles to be followed out in preventing this disease are precisely similar to those referred to under the head BLACKLEG in cattle. Shelter during severe winter weather is insisted on by shepherds as essential to prevent the malady.

In warm climates the same disease in sheep assumes an especially malignant type, and indeed constitutes one of the carbuncular diseases. Though the flesh is often eaten in the mountains of Scotland, it is most dangerous and condemned in southern Europe.

BRAY. A maritime town of Ireland, situated partly in the county of Dublin, partly in that of Wicklow, at the mouth of the Bray,

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thirteen miles southeast of Dublin (Map: Ireland, E 3). From a small fishing village Bray has developed into a popular watering-place, owing to the beauty of its situation. It has a long esplanade, good hotels, Turkish baths, electric lighting, etc., and is sometimes called the "Irish Brighton." Population, about 6900.

BRAY, Mrs. Ann Eliza Kempe (Stothard) (1790-1883). An English author, born in London. She published a considerable number of works of historical fiction and volumes of travel, including *The Borders of the Tamar and the Tavy* (1836); *Trelawny of Trelawne* (1837); and *A Peep at the Pixies* (1854). The fiction was collected in a twelve-volume edition in 1884, and in the same year appeared her *Autobiography*, edited by Kempe (London, 1884).

BRAY, Madeline. A beautiful girl in Dickens's novel *Nicholas Nickleby*, whose cruel and vicious father tried to force her to marry the old miser, Arthur Gride. The death of her father and the interposition of the Cheeryble Brothers, however, prevented it, and she married Nicholas Nickleby.

BRAY, brī, Otto Camillus Hugo, Count of Bray-Steinburg (1807-99). A Bavarian statesman. He was born in Berlin, and after completing his studies in that city, entered the diplomatic service of Bavaria. At first Counselor of Legation at Saint Petersburg and at Paris, he later successively became Ambassador to Greece and Russia, Minister of Foreign Affairs (1846-48-49), again Ambassador to Russia and Ambassador to Austria. In 1870 he succeeded Prince Hohenlohe as Minister of Foreign Affairs, in which capacity he negotiated the union between Prussia and Bavaria in 1870, and the admission of the latter into the German Empire. He retired from political life in 1896.

BRAY, Sir Reginald (died 1503). An English architect, a favorite of Henry VII. He built the chapel of that King in Westminster Abbey, and decorated Saint George's Chapel at Windsor.

BRAY, Thomas (1656-1730). An English prelate and philanthropist, born at Marton (Shropshire). He graduated at Oxford in 1678, and was appointed to the vicarage of Over-Whitacre and the rectory of Sheldon. In 1698 he founded the Society for Promoting Christian Knowledge, and in 1700, with the title of ecclesiastical commissary, organized the Anglican Church in the Province of Maryland. He was successful in obtaining the passage by the Provincial Assembly of the Act of Religion, which in 1701 received royal sanction. A charter was acquired by him in 1701 for the Society for the Propagation of the Gospel in Foreign Parts. In 1706 he became rector of Saint Botolph's, Aldgate. He projected and extended a system of parochial lending libraries to be established in every deanery, and in 1723 founded for the continuance of his work the society known as the 'Associates of Dr. Bray,' which still exists and publishes annual reports accompanied by his memoir. He was also interested in other benevolent enterprises. He published *Upon the Preliminary Questions and Answers* (1696; Vol. I. of *Lectures upon the Church Catechism*, incomplete); *An Essay Toward Promoting All Necessary and Useful Knowledge* (1697); a *Directorium Missionarium* (1726), and other works.

BRAY'MAN, Mason (1813-95). An American lawyer and soldier, born in Buffalo, N. Y. He was early apprenticed to a printer; was editor of the Buffalo *Bulletin* in 1834-35; and was admitted to the bar in 1836. After 1837 he lived successively at Monroe, Mich., Louisville, Ky. (where he edited the *Advertiser*), and Springfield, Ill. In 1843, as a special commissioner for the State of Illinois, he was charged with adjusting the difficulties arising from the settling of the Mormons at Nauvoo (q.v.), and in 1845-46 served as special attorney to prosecute the law-breakers on both sides. He was also instrumental in securing the removal of the Mormons from the State in the latter year. He revised the Illinois Statutes under authority of the Legislature in 1844-45, and from 1851 to 1855 acted as attorney for the Illinois Central Railroad. He entered the Federal Army as major of volunteers on the outbreak of the Civil War in 1861, was a chief of staff and assistant adjutant-general to General McClernand in 1862, was raised to the rank of brigadier-general of volunteers in September, 1862, repelled Van Dorn's attack on Bolivar, Tenn., was in command at Natchez in 1864-65, and at the close of the war was brevetted major-general for "gallant and meritorious services." He subsequently took an active interest in the organization and management of railroads, was editor of the *Illinois State Journal* in 1872-73, served as Territorial Governor of Idaho from 1876 to 1881, and from that time until his death practiced law at Ripon, Wis.

BRAZEN AGE, The. One of a group of four plays by Thomas Heywood. The group, known as *The Four Ages*, consists of *The Golden Age* (1611); *The Silver Age* (1612); *The Brazen Age* (1613); *The Iron Age* (printed 1632). The plays deal with the most famous of the Greek myths, and are largely founded on Ovid's *Metamorphoses*. The author's treatment of the subject does not rise entirely above the burlesque.

BRAZEN SEA. A large vessel of copper, 5 cubits high and 30 (or, according to the Septuagint, 33) in circumference, 10 cubits in diameter, placed by Solomon in the priest's court, for the use of servitors. It rested on 12 oxen, 3 placed on each side, with heads facing outward. The basin is said to have held about 2000 measures (baths) of water (I. Kings vii. 23-26); according to II. Chron. iv. 6, it was used by the priests for ablutions prior to approaching the altar, but it seems likely that it originally had a symbolical significance rather than a practical use. In the Babylonian religion, as in Semitic cults in general, the bull is a mythological emblem. Ahaz moved the brazen sea from the base of oxen and placed it on a stone base (II. Kings xvi. 17). The sea was finally broken by the Chaldeans and the copper carried to Babylon (II. Kings xxv. 13).

BRAZEN SERPENT. Moses is said to have made a serpent of brass and erected it on a staff before the people, so that whosoever looked upon it should be healed (Num. xxi. 9). In the time of Hezekiah the brazen serpent was looked upon as a sort of divinity and incense was burned to it. In his reform it was broken to pieces together with other insignia of foreign worship (II. Kings xviii. 4). Among the Egyptians the uræus-serpent was regarded as especially sacred and adorned the entrances to their temples. In

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the Assyrian and Babylonian sanctuaries, serpent images stood as guardians at the doors. The serpent was also looked upon by the Phœnicians as a god of healing.

BRAZIL', *Portug. pron.* brâ-zēl' (from the color of its dye-woods, *braza*, Portug. *braza*, a live coal), UNITED STATES OF. The largest country in South America, and one of the most extensive political subdivisions of the world, including the central and eastern portions of the continent. It is embraced, approximately, between latitudes 5° N. and 34° S., and between longitudes 35° and 74° W.; its greatest length from north to south is about 2660 miles, and from east to west 2700 miles; the total area is estimated at 3,218,139 square miles. Its limits on the northeast and southeast are the Atlantic Ocean, while the remaining portion of the northern boundary is formed by the Guianas, Venezuela, and Colombia; on the west, southwest, and south it touches Ecuador, Peru, Bolivia, Paraguay, Argentina, and Uruguay. It lies entirely to the east of the Great Andean system.

Northern and western Brazil is occupied by the basin of the Amazon, and while the political boundary extends to the mountains and highlands on the north, yet almost the whole of this section is a great plain, the so-called 'Selvas,' in which the altitude does not exceed 1000 feet, and the greater part is below 500 feet. The southern and eastern parts of Brazil are plateau-like in character, rising above 2000 feet in altitude, and much of it above 4000 feet; it is broken by the valleys of the Paraná and Uruguay in the south, of the Tocantins and its branches in the north, and the São Francisco in the central and eastern parts. Upon this plateau, which is sometimes designated the 'Highlands of Brazil,' stand many mountain ranges. It is the oldest part of South America. It was elevated bodily, with little, if any, distortion, and the present configuration of the surface is due to differential erosion, by which the harder and more resistant rocks have been preserved in the mountain ranges. It results from this mode of origin that the ranges are irregular in distribution and trend. They may, however, be grouped in three systems, the most important of which is the Serra do Mar, which forms the southeastern slope of the plateau to the narrow strip of coast along the Atlantic. In this system, west of Rio Janeiro, is the highest peak in Brazil, Itatiaia, probably not much over 9000 feet in height, although at one time thought to considerably exceed 10,000 feet. The system bears many different names in different parts, as Serra Geral, Serra da Mantiquiera, and Serra dos Aimorés. Connecting with this range near Rio Janeiro, and stretching northward, between the São Francisco and the streams flowing directly to the coast, is the Serra Central, while a third range trends northwestward, separating the heads of the São Francisco and Tocantins from those of the Paraná. Minor ranges and ridges separate the tributaries of these rivers from one another. West of this great plateau of East Brazil a highland stretches across to the Andes, dividing the waters of the Amazon from those flowing southward to the Rio de la Plata. On the north, the Tumuchumac and Acarai mountains separate Brazil from the Guianas, and the Serra Pacaraima separates it from Venezuela. The Atlantic coast line has a length of about 4000 miles. North of Cape Saint Roque it is comparatively low, and the slope toward the sea is gradual, but south of the Cape the coast line gradually becomes more elevated, the slope of the sea is steeper, and at the extreme south very abrupt. The northern coast is but little broken, and thus offers but few fine harbors, and not many islands; but at the south good harbors are not wanting.

HYDROGRAPHY. The rivers of Brazil possess a degree of importance greater than most of the other rivers of the world, since they form the chief, and in some cases the only, highways of travel and commerce through a region of great natural resources. Owing to the copious rainfall and the mild climate, navigation of most of them is possible throughout the year, in spite of their great fluctuations in volume from the wet to the dry season. More than two-thirds of Brazil, 2,235,000 square miles, is drained by the Amazons and Tocantins; about a fourth by the great arms of the Rio de la Plata, the Paraguay and Paraná; while the remainder is drained by the São Francisco and smaller streams. The Amazon with its great branches, the Negro, Yapurá, and Icá on the north, the Javari, Juruá, Purus, Madeira, Tapajos, and Xingú on the south, with the Tocantins, which joins it in its delta, affords a system of internal navigation comparable only to that of the Mississippi. The length of the main river from the Peruvian boundary to its mouth is about 2500 miles, practically all of which is navigable. The total length of the Amazon and its main branches within Brazil is estimated at 19,000 miles, of which 13,000 miles are navigable. The navigable stretch is much longer on the upper than on the lower branches, as the latter head in the plateaus of Guiana and southeast Brazil, and are interrupted by rapids and falls, especially where leaving the plateaus. Such is the case also with the São Francisco, where navigation is interrupted by the falls of Paulo Affonso, only 60 miles above the river's mouth. The waters of the São Francisco communicate with those of the Amazon through the Rio Preto, one of its main tributaries, and the Rio do Somno, an affluent of the Tocantins. The Negro, a large northern branch of the Amazon, is connected through the Casiquiare with the Orinoco. See also AMAZON; TOCANTINS, etc.

CLIMATE. Brazil lies almost entirely within the tropics, the region of the trade winds, and is dependent upon the latter for its rainfall, and upon the Atlantic as the source of moisture. Wet and dry seasons alternate, as the movement of the trades follows the sun from north to south, the effects being modified by the direction of the coasts and the relief of the surface. In the greater part of the country the climate is remarkably constant, with a fairly uniform temperature throughout the year, and a heavy rainfall. In the great Amazon Valley, which is low and moist, densely forested, and subjected at all times to the sweep of the trades, the temperature is never very high, rarely exceeding 95°. The annual range is slight, not exceeding 15° in the course of the year, and everywhere the moist winds afford a copious rainfall, ranging commonly from 75 to 100 inches, and increasing to much greater amounts at the foothills of the Andes, where the air-currents are forced upward into colder regions. It is believed that in some parts of the valley of the Amazon the rainfall is fully

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300-400 inches. While the wet and dry seasons are not strongly marked, most of the rain falls between January and June. On the coast of the plateau region of southeastern Brazil there is a greater range of temperature with the seasons, and a more strongly marked seasonal rainfall, the greater part of the annual precipitation coming in the summer, when the sun is south of the equator, and the trades have moved south with it. In the interior of this plateau region the seasonal distribution of the rain is still found, but the amount is much less than on the coast; indeed, in some regions, as between the São Francisco and the Paraná, the rainfall is deficient in amount.

FLORA. The flora of Brazil may be divided roughly into three zones—that of the lowlands of the Amazon basin, that of the southeastern plateau, and that of the broad divide separating tributaries of the Amazon from those of the Rio de la Plata in the interior. Vegetation on the lowlands of the Amazon is of the most luxuriant character, and the forests of the Amazon Valley are believed to be the most extensive and varied in the world. The botanical families most numerously represented are the Compositæ, Leguminosæ, Rubiaceæ, Aroideæ, and Filices. In marshy places and along streams, reeds, grasses, and water plants grow in tangled masses, and in the forest trees crowd each other in the struggle for life, and are draped with parasitic vines or bound together by a network of lianas. Along the coast mangroves, mangoes, cocoas, dwarf palms, and the Brazilwood are noticeable. Among the trees of the Amazon basin are the itauba, or stonewood, so named for its durability, the cassia, or cinnamon-tree, the lime, the myrtle, the guava, the bertholletia or 'Brazilnut' tree, the jacaranda or rosewood, the pas d'arco or bowwood, the Brazilian breadfruit, whose large seeds are used for food, the euphorbia, the copaiba, the macaranduba, with a bark rich in tannin and yielding a milky sap resembling india-rubber when coagulated, the large and lofty silk-cotton tree, the tall white trunked seringa or rubber tree, which furnishes the gum of commerce, and the numerous palms, of which there are three or four hundred species; chief among these are the carnauba palm, every part of which is useful, from the wax of its leaves to its edible pith, and the piassaba palm, the bark of which is clothed with a loose fibre used for coarse textile fabrics and for brooms. Orchidaceous plants, including several species of vanilla and showy epidendrums, rhexias, bignonias, etc., adorn the forest. The eucalyptus and other Australian trees and shrubs have been successfully introduced. There are several kinds of nutritious native grasses which furnish grazing throughout the year. Among the indigenous or broadly cultivated fruits are the pineapple, fig, custard-apple, mango, banana, guava, grape, and orange. European grapes, olives, and watermelons of fine flavor are cultivated. On the southeast coast, within the tropics, where the rainfall is abundant, there is a similar profuseness of vegetation, succeeded southward by plants of a more temperate climate. Inland, as the rainfall diminishes, upon the plateau, the vegetation becomes less abundant, and changes in character to open forests of smaller trees, with palms, ferns, and cacti. This is the catinga country. Farther west, on the divide, where the rainfall is scanty, is a prairie region, covered with grasses and herbaceous plants, in which are scattered groves of trees.

FAUNA. The animal life of Brazil is extremely varied, and differs in many important respects from that of the northern continent, and the Old World. Of larger animals, there are the puma, jaguar, ocelot, and several members of the dog family. The capibara, peccaries, and tapirs are abundant, also ant-eaters, sloths, opossums, and armadillos. Deer are plentiful in the more open country of the south, and monkeys of many species abound in the Selvas. There is a great variety of birds, which are characterized by the brilliancy of their plumage and their dissimilarity to the birds of other countries. Snakes are abundant, several species, including the rattlesnake and jararaca, being venomous; the boas reach an enormous size. The inland waters swarm with fish and turtles, and certain cetaceans ascend far up the Amazon. In no other river of the globe does the fish-fauna compare in the number of its species with that of the Amazon.

GEOLOGY. The southeast mountain region is in the main composed of crystalline rocks, including granite, gneiss, and schist of Archæan age. These rocks also extend westward from the States of Minas Geraes and São Paulo into the interior of Matto Grosso, forming the divide between the Amazon and the Plata River systems. A second Archæan area is found in the highlands bordering the Guianas, near the northern boundary, and there are smaller detached areas in the middle portions of the Tocantins and Xingú valleys, Paleozoic strata occupy the flanks of the Archæan, while the Cretaceous and Triassic beds cover a large portion of the plain of central Brazil. The Tertiary and Quaternary formations are developed along the Amazon Valley and the coastal regions. The Archæan rocks are the source of the famous diamond and gold deposits of Minas Geraes, which have been very productive in the past and are still the basis of an important mining industry. The manganese ore deposits in the same State are perhaps the most extensive in the world.

MINERAL RESOURCES. Brazil is probably the richest country in minerals in the world; but scarcity of population and capital, together with restrictive mining legislation, are in the way of an active development of the country's possibilities. It is estimated that no less than $600,000,000 worth of gold had been exported from Brazil prior to 1820, one-half of which came from the State of Minas Geraes, which is to Brazil more than California and Pennsylvania together are to the United States. Formerly there were extensive surface diggings of gold and diamonds, but they have been mostly exhausted. At present gold-mining is carried on to a limited extent in the States of Minas Geraes and Bahia, mostly with the aid of British capital. The production, which is steadily increasing, reached $2,500,000 in 1900. The same two States yield about 40,000 carats of diamonds a year. The total production since their discovery in 1723 is estimated at 12,000,000 carats, valued at $100,000,000.

Gold and diamonds do not by any means exhaust the mining wealth of the country. The less precious minerals, such as iron, lead, copper, zinc, manganese, and quicksilver, also

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BOLIVIA, BRAZIL, COLOMBIA, ECUADOR, GUIANA, PERU AND VENEZUELA.
SCALE OF ENGLISH STATUTE MILES.
0 50 100 200 300 400 500 600 700
APPROXIMATELY 920 MILES TO ONE INCH.
KILOMETERS.
0 50 100 200 300 400 500 600 700 800
Capitals of Countries :
Railroads :
Telegraph Lines :
Capitals of States, Provinces, Departments and Territories :
ATLANTIC OCEAN
Equator
Georgetown
Paramaribo
Cayenne
DUTCH (SURINAM)
FRENCH (CAYENNE)
Brazilian Guiana
Para
Maranhão (S. Luiz)
Ceará (Fortaleza)
Natal
Paraíba
Pernambuco
Maceió
Aracajú
Bahia
Rio de Janeiro
Petropolis
São Paulo
Santos
Cuyaba
Goyaz
Matta da Corda
MINAS GERAES
SÃO PAULO
PARANÁ
GOYAZ
MATO GROSSO
BAHIA
PIAUHY
CEARA
RIO GRANDE DO NORTE
PARAHYBA
PERNAMBUCO
ALAGOAS
SERGIPE
Mo. Vermelho
Martins Cataract
Plateau of
Tumuc Humac Mts.
Avarigua Mt.
Mt. Roraima
Mt. Orquin
Crevaux Pk.
Mouths of the Amazon River
Rio Para
Rio Tocantins
Rio Madeira
Rio Tapajoz
Rio Xingu
Rio Tocantins
Rio Parnahyba
Rio Paranahiba
Rio Paranaiba
Rio Grande
Rio Paraguay
Rio Paraná
Rio Tietê
Rio Paranapanema
Rio Ribeira
Rio Doce
Rio Jequitinhonha
Rio Mucuri
Rio Pardo
Rio Contas
Rio Grande
Rio Negro
Rio Branco
Rio Jurua
Rio Purus
Rio Madeira
Rio Tapajoz
Rio Xingu
Rio Tocantins
Rio Araguaya
Rio Tocantins
Rio Paraná
Rio Paraguay

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abound; but the mining of these metals is impeded by lack of cheap fuel and labor. Several attempts have been made in recent years, not only to mine iron and other ores, but to smelt them and even convert them into the finer manufactured products; but most of the smelting-works, blast-furnaces, and rolling-mills had to shut down on account of the difficulties mentioned. Some bituminous coal is mined in Rio Grande do Sul and Santa Catharina, and lignite in some of the other States; but neither the quality nor the quantity is such as to encourage mining on a large scale. Marble and other valuable building-stones are found in abundance. Rock salt, phosphate of lime, kaolin, and hot mineral springs add to the natural mineral wealth of the country.

AGRICULTURE. Only a small portion of the surface of Brazil is under cultivation. This is in great measure due to the unfertile character of the country as a whole, large tracts being wholly unproductive or subject to long-continued droughts. Again the agricultural population is small, as a rule, and the farms and plantations are tilled in a very primitive manner. In many parts the gathering of forest products is preferred. The most profitable crops—coffee and sugar—naturally have the largest areas devoted to them, tobacco and cotton coming next. The coffee-plant is most extensively grown in the States of Rio de Janeiro, Minas Geraes, and São Paulo, but can be grown in nearly every part of Brazil. The annual yield increased from 4,600,000 bags (of 132 pounds each) in 1890 to 11,000,000 in 1900. Nearly all the coffee used in the United States comes from Brazil, which is the largest coffee-producer in the world. The Atlantic States yield the sugar supply, especially Bahia and Pernambuco. Cotton of excellent quality is produced in every State, but Pernambuco and Maranhão are said to be best fitted for it. The tobacco is inferior to that of the West Indies. The greater part of the tobacco exported is grown in Bahia. Maize is one of the leading products of Minas Geraes and São Paulo, but not enough is raised for home consumption; and the same is true of rice. The small grains do not flourish. Among the more common food products are sweet potatoes, yams, beans, and the farina prepared from the root of the manioc (q.v.) or cassava. Cocoa is grown in northeastern Brazil, and the holly, or ilex, which yields the maté (q.v.), or Paraguay tea, is cultivated to some extent in the extreme southern States, where it is indigenous. Pumpkins, squashes, cabbages, okra, tomatoes, onions, cucumbers, and other vegetables are raised. The raising of cattle and the breeding of horses give occupation to many in the southern State of Rio Grande do Sul. Although Brazil has many kinds of durable woods, timber for making railroad-cars is imported from India. Large quantities of salt fish are brought from the United States, when Brazil might easily supply her needs by improving her own fisheries.

MANUFACTURES. Long occupying a subordinate place as compared with agriculture, mining, and the collecting of forest products, manufactures are becoming more important. They are taking the natural course of development, those industries thriving most which are devoted to the manufacture of goods from the natural agricultural and mining products of the country. Thus, the textile industry is the most important, cotton spinning and weaving taking first rank, followed by woolen manufactures. There were more than 150 cotton-factories at the end of the century, scattered all over the country, the majority and most important of them being located in the States of Rio de Janeiro, Minas Geraes, and São Paulo. The same is practically true of the location of the woolen-mills, whose number, however, is small. Sugar-refining is the next industry in importance. In the States of Bahia and Pernambuco and elsewhere the refining of sugar is extensively carried on by the diffusion process, and in remote districts by somewhat primitive methods. Several kinds of rum are distilled in the sugar districts, and cigar-making is an important industry. The smelting of metals, the manufacture of steam-engines and agricultural tools, the tanning of leather and working of hides, and the manufacture of salt, straw hats, soap, and candles employ many hands, and within recent years the list of artificial products has been lengthened by the addition of paper, calicoes, powder and dynamite, glass, wines, beer, cotton-seed oil, castor-oil, wax matches, and sulphuric acid. Shipbuilding is carried on in several parts.

TRANSPORTATION AND COMMUNICATION. The first railway in Brazil was opened to traffic in 1854. It was only 10 miles long, and connected Porto de Maua, on the Rio de Janeiro Bay, with Ruiz de Serra. The line was a purely private undertaking. In 1858 the first private line built under a Government guarantee was constructed, the same year having witnessed the opening of the first Government railway. Since then the Government has taken an active part in railway development, so that at the close of the century the Government operated nearly 65 per cent. of the entire railway mileage of the country. Of this one-fourth was owned by it, and the rest was leased to it by private companies. Of the remaining 35 per cent. of the country's mileage, nearly 30 per cent. had the payment of interest guaranteed by the Government. Thus only about 5 per cent. of the railway mileage of the country is under absolute private control. The growth of railways in Brazil has been as follows: 1860, 80 miles; 1870, 450; 1880, 1984; 1890, 4742; 1899, 8718. In addition, there were under construction in the last year nearly 5000 miles.

SHIPPING. In 1890 the merchant marine of Brazil included 115 steamers and 149 sailing vessels; in 1898 the number of steamers was 229, or double that of eight years before, with a tonnage of 94,262 tons, and the sailing vessels increased to 344, or more than 130 per cent., with a tonnage of 88,000 tons. This remarkable growth of Brazil's merchant marine, which far outstripped the increase of its commerce, was in great part due to the new law which came into force in 1896, excluding all foreign vessels from the coasting and river trade, as well as the system of subsidies granted by the Government to native shippers. In the closing years of the century Brazil was annually visited, on the average, by more than 1000 foreign steamers of nearly 2,000,000 tons burden. The chief port is Rio de Janeiro, the New York of Brazil, receiving more than one-half of Brazil's imports and shipping more than one-third of its exports. Other important centres of foreign

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commerce are Bahia, Pernambuco, Ceará, Parahyba, in the north, and Paranagua, Desterro, Porto Alegre, and Rio Grande do Sul, in the south. In 1867 the Amazon was opened to all nations. Twenty-three steamship lines are subsidized by the Government, including two from Santos to Hamburg and Genoa. Of six lines between Brazil and the United States, four are British and one is German.

COMMERCE. Brazil has a larger foreign commerce than any of the South American republics. In 1861 the exports from Brazil were valued at about $20,000,000; in 1890 they rose to $140,000,000; and in 1900 were estimated at $170,000,000. The imports amounted to $115,000,000 in 1890 and $122,000,000 in 1898. Coffee is the staple article of commerce, meaning more to the exports and to the prosperity of Brazil than wheat does to the United States. It constitutes about 60 per cent. of the total exports of the country. More than two-thirds of the coffee goes to the United States, and the remainder to Europe. Sugar is next in importance among the exports, and is followed by rubber, cotton, cottonseed, hides, tobacco, cocoa, maté (or Paraguay tea), dye, and cabinet woods, gold, diamonds, etc.

The imports consist of all kinds of manufactured goods, cotton and woolen fabrics, machinery, ironware, coal, petroleum, and foodstuffs, including flour, corn, dressed beef, pork, butter, lard, olive-oil, wines, etc. Great Britain controls the largest share (41 per cent.) of the import trade. Germany has recently outstripped France, having brought in 11 per cent. of Brazil's imports in 1899, as against France's 10 per cent. The United States is next in importance. In the foreign commerce of the United States, Brazil is occupying a place of great, though steadily declining, importance. In 1890 the imports from Brazil to the United States were next only to those of Great Britain and Germany in value. In 1900 they were behind those from the two countries mentioned, as well as France, declining from $83,000,000 in the former year to $58,000,000 in the latter. The exports from the United States to Brazil declined from $14,000,000 to $11,500,000 during the same period. In 1890 the exports to Brazil were five times as large as those to Argentina; in 1900 they were nearly equal.

BANKING. There are no banks of issue in Brazil, for the reason that the currency has been inflated to such an extent by previous excessive issues of paper money that the Government has its hands full in trying to reduce the existing volume of paper money without thinking of new issues. The first bank established in Brazil, the 'Banco do Brasil,' was founded in 1808. It led a precarious existence until 1829. Modern banking dates from 1853, when the new 'Banco do Brasil' was established with a capital of 33,000,000 milreis as a bank of issue. In 1890 three more banks of issue were established, the 'regional' banks for north, central, and southern Brazil, with a total capital of 450,000,000 milreis, which was to be invested in five per cent. Government bonds. The banks were given other privileges, the most important of which was the exemption from import duties of all goods brought in by them. This secured for them an absolute commercial monopoly, which naturally led to great dissatisfaction among the business interests. In the meantime the issue of paper money by the three banks, the national bank, and a number of other banks which had also been authorized to issue paper money, swelled the total amount of it in circulation to over 700,000,000 milreis, resulting in the usual disastrous consequences of inflation. More than 100,000,000 milreis of paper money was destroyed by the Government in 1900, but the amount in circulation still remained at the high figure of over 699,000,000 milreis. Gold is supposed to be the monetary standard, although it has been driven out of circulation by paper.

GOVERNMENT. Brazil is a republic, comprising twenty States and a Federal District under a constitution adopted February 24, 1891. The legislative power is vested in the President of the Republic, and a national Congress, consisting of a Senate and a House of Representatives. The Senate is composed of three members from each State and from the Federal District, elected directly by the people for a period of nine years, one-third of the number being renewed every three years. The House of Representatives consists of 212 deputies elected by popular vote for three years upon the basis of one representative to every 70,000 of the population; no State, however, may have less than four representatives in the Lower House. The franchise is granted to all male citizens above the age of twenty-one—with the exception of beggars, illiterates, soldiers, and members of religious associations. The executive authority is exercised by a President elected by direct popular vote for a term of four years. He is assisted by a Cabinet of six ministers, who preside over the following departments: finance; war; industry, railways, and public works; foreign affairs; navy; interior; and justice. They are not responsible to Congress nor can they participate in the debates of either House, but they may appear in their official capacity before the Congressional committees. The President possesses the veto power on legislation, but his veto may be overruled by a two-thirds vote of both Chambers. The judicial power is vested in a Federal Supreme Court consisting of fifteen members appointed for life by the President with the approval of the Senate.

The Constitution of Brazil was modeled after that of the United States, but differs from it in the complete autonomy which it leaves to the individual States, an autonomy amounting almost to decentralization. The States are governed by their own legislatures and governors, and possess their own judicial systems. The Federal Government may intervene in local affairs only for the purpose of repelling foreign invasion, or of preserving a republican form of government, or of enforcing the execution of Federal laws. The public domains within the boundaries of any State are the possession of that State and under its control. A State may subdivide its territory at pleasure or consolidate with another State. Though the control of foreign affairs is delegated to the Federal Government, single States have frequently sent abroad representatives, endowed with all the powers of fully accredited plenipotentiaries, for the purpose of negotiating important commercial treaties and despatching public business. In general there is a disposition on the part of the States to reduce the Federal authority to a minimum, and this tendency is more pronounced in those States that are far

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removed from the seat of the central Government.

The States are divided into 1023 municipalities whose affairs are controlled by a council and a prefect. The term municipality does not bear the usual meaning of a civic corporation, but denotes rather a district, or territorial division, for we find that included within these 1023 municipalities are 225 cities, 468 villages, and 684 communes. In Rio Janeiro the municipal head is appointed by the President of the Republic.

Justice is administered in the first instance by justices of the peace (elected by the municipalities) in civil disputes, and by the commissioner of police in criminal cases. Appeals are made to courts of second instance, which are composed of trained jurists, and from them to the courts of appeal, of which there is one in the capital of each State. The criminal code has been revised very recently (1893—), but the main body of civil law is still identical with the old Portuguese Code.

Army.—The standing army is recruited by voluntary enrollment, but conscription by lot is resorted to whenever the established quota cannot be obtained through enlistment. All Brazilian citizens are bound to take up arms for the defense of the nation. Wars of aggression are forbidden by the Constitution.

For further details as to military equipment, see section *Modern Armies*, under ARMIES, and section *Modern Navies*, under NAVIES.

Weights and Measures.—The metric system has been in vogue since 1862. The gold milreis is worth 54.6 cents; the paper milreis about one-fourth of that.

FINANCES. The financial conditions of Brazil are not better than those of any other South American country, if indeed they are not in a worse plight. Reckless extravagance or unscrupulous handling of public funds by the political parties in power, a too liberal use of the printing-press for turning out paper money whenever the needs of the hour make it impossible to obtain money in any other way, and a general disregard of the simplest rules of public finance—all combine to create a financial condition verging on bankruptcy. This, too, in a country hardly having its equal in the world for the wealth of natural resources, salubrious climate, and other conditions which make for prosperity. The first example of extravagance beyond income and of shiftlessness in management of public finance was given early in the Nineteenth Century by King John VI., who fled with his Court to Brazil after his overthrow in Portugal. In the course of time matters became somewhat improved under the monarchy, but the inauguration of the republic brought about a new régime of recklessness fanned by party feuds and political upheavals. It must also be added, in justice to the republic, that the enormous debts piled up as a result of the costly wars carried on under the monarchy left no small burden for the former to shoulder. However, the expenditures were allowed to increase beyond the revenue from year to year, and the deficits were covered by fresh loans on new issues of paper money. The degree of extravagance reached in that practice may be seen from the following illustration: The number of persons engaged in the navy increased from 11,427 in 1890 to 14,286 in 1900, or 25 per cent., while the expenditures increased more than 155 per cent., being less than 9,000,000 milreis in the former year and over 23,000,000 in the latter. Similar figures could be quoted for the other departments, the result for the total budget being an increase of about 40 per cent. in the number of persons employed by the Government and 175 per cent. in the expenditure. In other words, the providing of political offices for the members of the party in power, coupled with unreasonable additions to their salaries and excessive prices paid by the Government for all kinds of supplies, was responsible for the great increase of expenditure; and as the revenue meanwhile continued to fall behind, the national debt rapidly increased. In 1901 the total gold debt was 421,945,449 milreis; in 1897 it was 606,575,000; the paper debt increased in the same period from 503,222,000 to 1,398,403,972 milreis. In 1889 the gold and paper debts were interchangeable at par; in 1897 the rate of exchange rose from 4 to 1. In 1898 the Government found itself unable to meet its obligations, and to avoid suspension of payment negotiated with the London house of Rothschilds a new funding debt, limited to $50,000,000.

This loan is of great importance for the possibilities, embodied in its terms, of a permanent improvement in the financial conditions of Brazil. According to these conditions the Government was to retire an amount of paper money equal to the new debt. A new sinking fund for the ultimate retirement of the bonded debt was provided for. This fund, to be begun in 1911, is to be formed from yearly deposits each equal to one-half per cent. of the existing debt. The effect of the new provisions is already making itself felt. The total amount of paper money in circulation, which had swollen from 186,000,000 milreis in 1889 to 702,000,000 in 1897, was reduced to about 700,000,000 in 1900. The more business-like administration of finances which followed brought about a surplus in 1900 exceeding $14,000,000 in United States money, in spite of the retirement of a considerable amount of paper money.

The chief sources of revenue under the new régime are import duties, which furnish one-half the total revenue; next in importance are excise, railways, stamps, posts, and telegraphs.

POPULATION. Previous to 1872, when the first full census was taken, the estimates were based upon the official returns of 1817 and 1818. In 1850 the population was supposed to be about 7,000,000, and in 1860, 8,000,000. In the following table the figures for 1872 include about 250,000 wild Indians. The figures for 1890 are from the census returns of December 31, 1890.

The population of Brazil is the largest of any country in America except the United States. The average density of 4.5 persons to the square mile is, however, far behind that of some of the Spanish-American countries, Mexico having 17.6, Chile 9.3, and Colombia 7.7. As in nearly all countries having a considerable immigration, the number of males is in excess of females, the respective numbers of the last census having been 7,237,932 and 7,095,983. Less than one-half of the people are whites; one-third are half-breeds; one-seventh negroes; and less than one-tenth Indians, nearly one-half of whom are practically savages. A considerable proportion

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of the so-called whites are people of mixed Caucasian, Indian, and negro origin. As shown by the table, several of the larger States of Brazil are almost devoid of population, the bulk of the people living along the coast.

STATE	Area	Population		Population per square mile
		1872	1890	
Alagoas	22,580	348,009	511,440	22.1
Amazonas	732,250	56,610	147,915	0.2
Bahia	164,600	1,283,141	1,919,802	11.0
Ceará	40,240	721,686	805,687	20.0
Espirito Santo	17,310	82,137	135,997	7.2
Goyaz	288,470	160,395	227,572	0.7
Maranhão	177,520	359,040	430,854	2.4
Matto Grosso	532,550	60,417	92,827	0.2
Minas Geraes	221,890	2,009,023	3,184,099	14.3
Pará	443,790	259,821	328,455	0.7
Parahyba	28,850	362,557	457,232	15.7
Paraná	85,430	126,722	249,491	2.8
Pernambuco	49,560	841,539	1,030,224	20.7
Piauhy	116,490	202,222	267,609	2.3
Rio de Janeiro	26,630	727,576	876,884	32.9
Rio Grande do Norte	22,190	233,979	268,273	12.8
Rio Grande do Sul	91,250	430,878	897,455	9.8
Santa Catharina	28,620	159,802	283,769	9.9
São Paulo	112,280	837,354	1,384,753	12.3
Sergipe	15,090	161,307	310,926	20.6
Federal District	540	274,972	522,651	960.5
Aggregate	3,218,130	9,700,187	14,333,915	4.5

IMMIGRATION. The chief cause of Brazil's backwardness is its lack of a skilled, intelligent, industrious population. Nothing is more natural, therefore, than that the Brazilian Government should try to attract European immigration by offering the immigrants abundant land to settle on. The immigration laws of Brazil, like those of Argentina, were drafted solely with that end in view, but have never been carried out with the persistency or ability which has marked the policy of the Argentinians, and therefore have not been crowned with the same degree of success. From the earliest time most of the immigration into Brazil came from Spain, Portugal, and Italy. The German immigration which began in 1825 soon reached considerable proportions under the fostering care of the Hamburg 'Kolonisationsverein,' so that by the end of the seventies there were from 150,000 to 200,000 Germans in the country. These people were attracted to the southern States of Brazil—Rio Grande do Sul, Santa Catharina, and São Paulo—where the Government offered them, in addition to free transportation from Europe to the place of destination, from 60 to 125 acres of land per family and furnished provisions, implements, and seeds until the time of the first crop. The land was not given free to the settlers, but sold at the low price of from $1 to $2 per acre, to be paid to the Government in from seven to ten years. The object of the Government in settling the southern States was not only to increase the population in the most thinly settled parts of the country, but to create a European population capable of raising European agricultural products in the region best adapted for that purpose. That would create a cheap food-supply for the more northern States, which could then be entirely devoted to the cultivation of the more valuable tropical crops of coffee, sugar, etc.

The plans succeeded so well that the Government was soon afraid of the preponderating influence of the German population in the south, and began to favor the immigration of Italians and Poles, of whom about 100,000 came in the years 1890 and 1891. The liberal provisions of the law were not, however, carried out long, and the Government confined itself later on only to granting free passage to the country, employing the newly arrived immigrants in road-building on the land which they were to settle. This naturally led to a decline in immigration, since the newcomers found it difficult, if not impossible, to save enough from their small earnings as laborers to buy land and cultivate it. In 1891 the Government enacted a new colonization law favoring colonization by strong financial companies willing to invest large sums of capital for the purpose. Any company could purchase from the Government great tracts of land at twenty cents per acre, which they were to resell to colonists whom the companies were to bring into the country at their own expense. The Government was to pay the companies a subsidy of $230 for each family brought in, and $700 additional for each mile of road laid out. The terms of the new law were so favorable that companies immediately formed and secured concessions for more than 150,000 square miles of land. But the political troubles which set in in 1893 put an end for the time being to all financial aid to immigration by the Government. In all, the Government spent about $25,000,000 on immigration until 1890. The total immigration in the decade of 1880-90 amounted to nearly 400,000. In 1890, it was 107,000; 1891, 217,000; 1895, 170,000; 1898, only 54,000.

EDUCATION is in an extremely backward state, especially in the interior of the country. Primary instruction is free, and every parish is supposed to possess one teacher for boys and one for girls, but in fact, the number of pupils attending the elementary schools constitutes but a very small fraction of the population of school age. The percentage of illiteracy for the entire nation is over eighty. In the cities on and near the coast the level of general culture is much higher, for they contain all the institutions of secondary and higher learning controlled by the Federal Government. At Rio de Janeiro are the two high schools, known jointly as the *Gymnasio Nacional*. There are schools of medicine at Bahia and Rio de Janeiro, schools of law and politi-

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cal science at São Paulo and Pernambuco, four military schools giving courses in civil engineering, a naval academy, a polytechnic school, a school of mines, a number of agricultural schools, a conservatory of music, and an academy of fine arts. The larger cities have museums and libraries, and the National Library at Rio de Janeiro has a magnificent collection of printed volumes, manuscripts, and iconographical exhibits, numbering, in all, over 525,000 pieces.

RELIGION. Church and State are entirely separated, but the Government provides for the maintenance of the Roman Catholic religion, which is the faith of 99 per cent. of the people. The country is divided into eleven episcopal sees, in each of which a theological seminary is located. The Archbishop of Bahia is metropolitan of the province and under him are 11 bishops, 12 vicars-general, and about 2000 curates.

HISTORY. By the provision of the treaty of Tordesillas, signed by Portugal and Spain in 1494, most of the territory within the present limits of Brazil fell to the share of the former. Early in 1500 Vicente Yañez Pinzon landed on the coast of Brazil, probably near Cape Saint Augustine, and coasted as far as the Orinoco River, discovering the mouth of the Amazon. In the same year Pedro Alvarez Cabral landed at Porto Seguro, and, taking possession of the country in the name of his monarch, gave it the name of Vera Cruz, later changed to Santa Cruz. In 1501 and 1503 the country was visited by expeditions under Amerigo Vespucci, who in the latter year left a garrison of twenty-four men behind him and returned with a cargo of Brazilwood, which gave the vast region its name. The first permanent settlement was made by the Portuguese on the island of São Vicente in 1501, other colonies founded subsequently being abandoned on account of the hostilities of the Indians. Bahia was founded in 1549 and till 1763 was the capital of Brazil. The Huguenot settlement established in the Bay of Rio de Janeiro in 1555 was broken up in 1567 by the Portuguese, who founded the town of Rio de Janeiro. From 1580 to 1640 Brazil as a dependency of Portugal was in the possession of Spain, and in the latter part of this period the Dutch, who were at war with Spain, seized upon a considerable portion of the country, which they held for some time. In 1630 they captured Pernambuco and retained the stronghold of Olinda till 1654. Between Portugal and Spain there was a long standing dispute concerning the possession of the eastern shore of the La Plata, which was not settled until 1828, when Brazil recognized the independence of the Banda Oriental (see URUGUAY). The discovery of gold in 1691 and of diamonds in 1710 resulted in the rise of a number of mining towns. The arbitrary colonial order under which Brazil had been settled, the so-called captaincy system, similar to the patroon system in New York, greatly retarded the progress of the country. In 1807, under the pressure of French invasion, the royal family of Portugal fled to Brazil, which remained virtually the seat of government until 1821, when King John VI. returned, leaving his eldest son, Dom Pedro, as Prince Regent; but in the following year (September 7, 1822) the independence of Brazil was proclaimed, and on October 12 the Prince Regent was crowned Emperor. Early in 1824 he took his oath to the Constitution, and in 1825 the independence of Brazil was formally recognized by the Portuguese King. Dom Pedro soon became unpopular, and in 1831 abdicated in favor of his five-year-old son.

Under the regencies which followed, Brazil was plunged into disorder and political intrigue, and the result was that, as a reaction against republicanism, the young prince was declared of age in 1840, and in 1841, at the age of fifteen, was crowned Emperor, as Dom Pedro II. The only wars during his reign, aside from a few revolutionary outbreaks, were those waged against Rosas, the Dictator of Buenos Ayres, in 1852, and against Paraguay in 1865-70. Pedro II. was a patriotic and enlightened monarch. Among the events of his administration was the passage of an act in 1871 providing for the gradual abolition of slavery. The centralized system of government, however, and the general prevalence of corruption in the provincial administration, excited a widespread feeling of discontent, especially in the army, and an attempt in 1889 to form a national guard under imperial control hastened the crisis. On November 15 intelligence that Rio Janeiro was in the hands of the insurgents reached the Emperor at his country-seat, and on hastening to the capital he found that the Ministry had been deposed. Later in the day a Provisional Government, headed by Marshal Deodoro da Fonseca (q.v.), was organized, which issued a manifesto proclaiming a republic. All these changes met with little opposition; indeed, it had been long and widely believed that the Empire would not outlive the Emperor. Dom Pedro attempted to form a new Ministry, but failed, and a new decree ordered him to leave the country with his family within twenty-four hours. The same decree continued the imperial dowry and granted the Emperor a subsidy of $2,500,000, both of which he refused. On the following day, November 16, the Emperor and his family embarked for Portugal, and the concession (November 21) of universal suffrage to all Brazilians that could read and write was followed by the appointment of a commission to draft a Federal Constitution. On January 10, 1890, the separation of Church and State was decreed by the Provisional Government. The new Constitution (subject to further revision) was promulgated on June 23. In February, 1891, Marshal Fonseca was elected the first President of the Republic, but before the close of the year his arbitrary proceedings provoked a revolutionary movement in Rio de Janeiro, which forced him to resign. He was succeeded by the Vice-President, General Peixoto. In 1893 a revolt, probably aiming at the restoration of the Empire, was headed by Admirals Da Gama and Mello and supported by the navy. Rio de Janeiro was blockaded and shelled by the rebels, but, owing largely to the unfavorable attitude of the United States, whose war-vessels broke the blockade, the revolt (which was accompanied by insurrections in some of the States) collapsed early in 1894, and the insurgents fled or surrendered.

Peixoto was succeeded later in the same year by Dr. Prudente de Moraes. Another rising, headed by a religious fanatic, Antonio Conseilheiro, broke out in 1897 in the State of Bahia. It was probably assisted financially to some extent by the partisans of the old Empire, and threatened for a few months to cause the Government much trouble, but it was eventually crushed. An attempt to assassinate President

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Moraes on November 5th of the same year resulted in the discovery of an important plot against the existing Government, which immediately collapsed. In March, 1898, Dr. Campos Salles, who had long been an active participant in the republican political propaganda, was elected President and quietly installed.

BIBLIOGRAPHY. Wappäus, *Handbuch der Geographie und Statistik des Kaiserreichs Brasilien* (Leipzig, 1871); Mulhall, *Handbook of Brazil* (Buenos Ayres, 1873); Levasseur, *Le Brésil* (Paris, 1889); Fletcher and Kidder, *Brazil and the Brazilians* (London, 1880); Child, *The Spanish-American Republics* (New York, 1891); Hartt, *Geology and Physical Geography of Brazil* (Boston, 1870); Derby, "Physische Geographie und Geologie von Brasilien," in *Mitteilungen der geographischen Gesellschaft zu Jena*, Vol. V. (Jena, 1886); Liais, *Climat, géologie, faune et géographie botanique du Brésil* (Paris, 1872); Martius, Eichler, and Urban, *Flora Brasiliensis* (Munich, 1897); Carapebus, *Notices sur les ressources minérales du Brésil* (Paris, 1885); Wells, *Exploring and Traveling Three Thousand Miles Through Brazil* (Philadelphia, 1886); Andrews, *Brazil, Its Conditions and Prospects* (New York, 1891); Schanz, *Das heutige Brasilien, Land, Leute und wirthschaftliche Verhältnisse* (Hamburg, 1893); Still, "Brazilian Position and Prospects," in *The Journal of Finance*, Vol. III. (London, 1898); Constatt, *Das republikanische Brasilien, in Vergangenheit und Gegenwart* (Leipzig, 1889); Lamberg, *Brasilien, Land und Leute in ethnischer, politischer und volkswirthschaftlicher Beziehung und Entwickelung* (Leipzig, 1899), based upon twenty years' study and sojourn in Brazil; *The United States of Brazil: A Geographical Sketch, with Special Reference to Economic Conditions and Prospects of Future Development*, Bureau of the American Republics (Washington, 1901); Santa-Anna Néry, *The Land of the Amazons*, trans. by Humphry (New York, 1901), contains numerous bibliographical references. Much valuable information may also be derived from *Revista trimensal de historia e geographia*, published by the Instituto historico, geographico e etnographico do Brazil (Rio de Janeiro, 1839, et seq.).

For a standard history in English, consult: Southey, *History of Brazil* (London, 1810-19); continued by Armitage (London, 1836), whose work covers the period of the Braganza family's residence in America; for an authoritative general work in Portuguese, Varnhagen, *Historia geral do Brazil* (Rio de Janeiro, 1855); and for Brazil in the Nineteenth Century, Da Silva, *Historia do fundação do imperio braziliero* (5 vols., Rio de Janeiro, 1864-82); for an account of the fall of the Empire and the rise of the Republic, Fialho, *Historia d'estabelecimento da republica dos Estados Unidos do Brazil* (Rio de Janeiro, 1890).

BRAZIL'. A city and railroad centre, the county-seat of Clay County, Ind., 57 miles west-southwest of Indianapolis, on the Chicago and Eastern Illinois, the Chicago and Southeastern, the Evansville and Indianapolis, and Terre Haute and Indianapolis railroads (Map: Indiana, B 3). Block-coal mines in the vicinity are the field of the chief industry. The city has also manufactures of mining engines and machinery, tile, sewer-pipe, pumps, and brick. An inexhaustible supply of clay and shales of superior quality opens up possibilities for an immense trade in clay products, the manufacture of which is already considerable. Brazil owns and operates its water-works, and has a public library. Settled in 1856, it was first incorporated in 1873. Under the present charter. Brazil is governed by a mayor, elected every four years, and a city council. Population, in 1890, 5905; in 1900, 7786.

BRAZIL, ISLAND OF. See MYTHICAL ISLANDS.

BRAZIL CABBAGE (so called on account of its southern origin), or CHOU CARAIBE (*Caladium sagittifolium*, or *Xanthosoma sagittifolia*). A plant of the natural order Araceæ, and native of the West Indies. It is now in common cultivation throughout the tropics. The rhizomes are rich in starch, and form an important source of food in the regions where it is cultivated; the leaves are also boiled and used as 'greens.' Both root and leaves are almost entirely destitute of the acridity so generally characteristic of the order.

BRAZ'ILET'TO-WOOD. See BRAZILWOOD.

BRAZILIAN GRASS. An incorrect name applied to a substance used in the manufacture of a cheap kind of hats, known as Brazilian grass hats and also as *chip* hats. It consists of stripes of leaves of a palm (*Chamærops argentea*), which are imported to Great Britain and elsewhere for this manufacture, chiefly from Cuba. See CHAMÆROPS.

BRAZILIAN PLUM. See HOG PLUM.

BRAZILNUTS, CREAM-NUTS, or NIGGER-TOES. Seeds of Bertholletia excelsa, a majestic and beautiful tree of the natural order Myrtaceæ. This tree grows to the height of 100 or 120 feet, and abounds on the banks of the Orinoco and in the northern parts of Brazil. It produces a round, woody pericarp, or seed-vessel, almost as large as a man's head, within which are many of the seeds, or nuts. The pericarp is very heavy and solid, requiring the blow of a sledge-hammer to break it; when ready to fall it is dangerous, on account of its weight, to walk under the tree. The seeds, which are popularly called nuts, vary from eighteen to twenty-four, and are wrinkled and triangular, having a hard shell and a pure-white kernel, which when fresh is very agreeable. They are chiefly exported from Pará and French Guiana, and are well known in stores. They yield a large quantity of oil, which is good for burning. The nuts or seeds of the Monkey-Pot tree, or Lecythis Ollaria, are produced in a pericarp which resembles a rusty iron pot with a lid, the lid dropping off and letting out the seeds, which are oblong, grooved, and esteemed of a quality very superior to the common Brazil-nut. They are sometimes known as Sapucaia nuts, but they have not yet become an article of commerce, as the trees grow chiefly in the interior parts of the country. For illustration, see BREADFRUIT, ETC.

BRAZILWOOD. A dark-red or yellowish-brown dye-wood, which forms a considerable article of export from Brazil, where some of the trees which yield it are very abundant. It is the product of different species of Cæsalpinia. The best kinds are those called Pernambuco wood, All Saints' wood, and Saint Martha wood.

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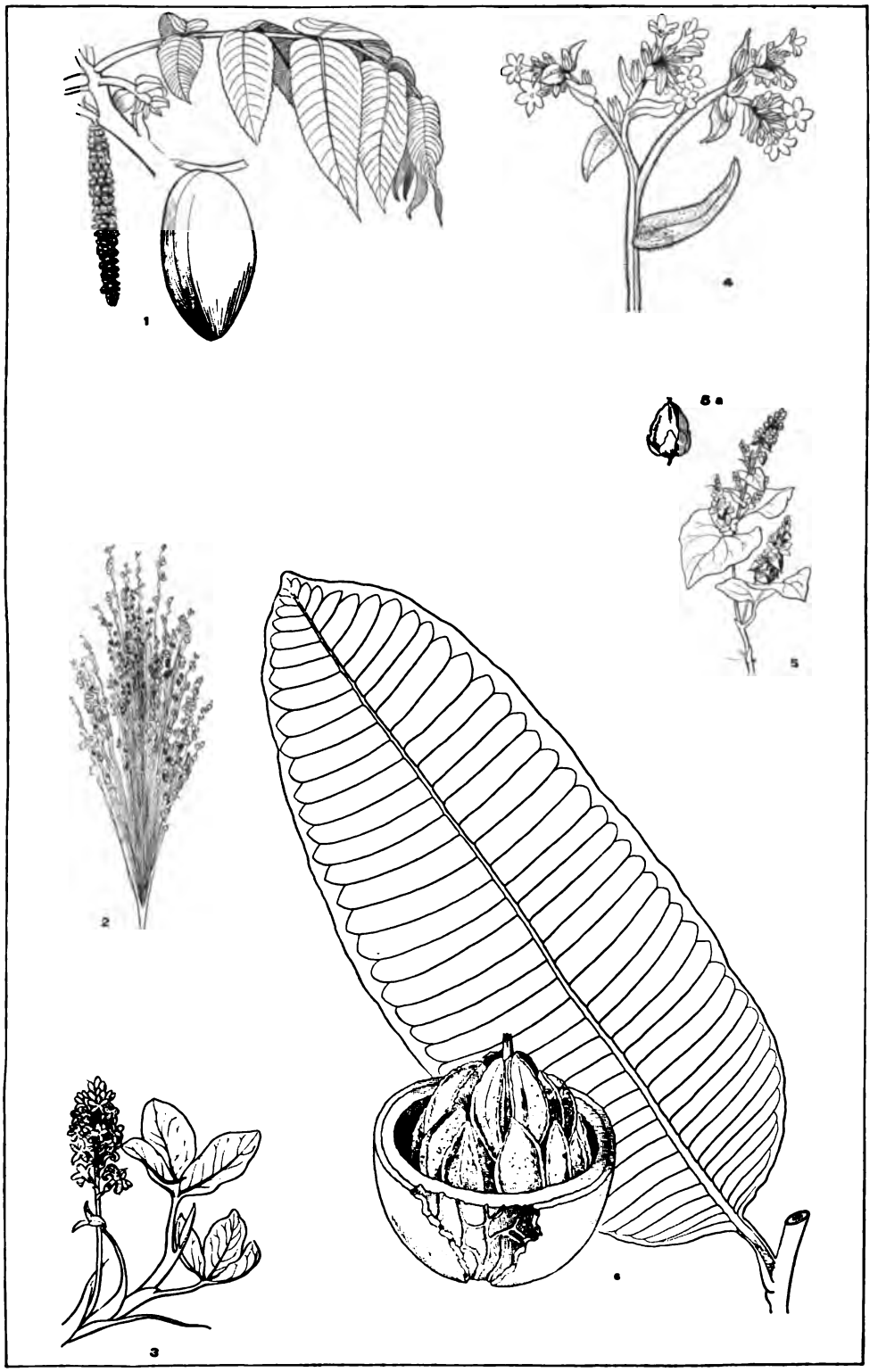
BRAZIL NUT, ETC.



1. BUTTERNUT (Juglans cinerea).
2. BROOM CORN (Sorghum vulgare).
3. BUCKBEAN (Menyanthes trifoliata).
5. BUCKWHEAT (Fagopyrum esculentum).
5a. BUCKWHEAT, enlarged grain.
6. BRAZIL NUT, LEAF AND POD (Bertholletia excelsa).

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Some confusion exists as to the exact botanical identity of the different varieties of Brazilwood. Much of the Brazilwood of commerce is obtained from *Cæsalpinia Brasiliensis*, a tree which is a native of the West Indies, commonly growing in dry places and among rocks, and seldom exceeding 30 feet in height. It has bipinnate leaves, with many smooth, obtuse, oblong leaflets and no terminal leaflets, the flowers in panicles, with downy stalks. The heartwood alone is of any value. Pernambuco Wood is the product of *Cæsalpinia echinata*. The sapwood is extremely thick, and the valuable heartwood bears a small proportion to the whole diameter of the stem. The Sappanwood (q.v.) of the East Indies nearly approaches Brazilwood in quality. It is the product of *Cæsalpinia sappan*, a small, thorny tree. The Braziletto-wood, sometimes also called Brazilwood, which is brought from the Antilles, is much inferior. *Cæsalpina crista* probably yields some of the inferior West Indian Brazilwood. Brazilwood is said not to take its name from Brazil, but to be mentioned under the name *Brawilis* in documents much older than the discovery of America, the sappanwood of the East Indies being probably intended.

When freshly cut, the color of Brazilwood is yellow; but when exposed to air, moisture, and light, it becomes red, and is generally sent into market ground down to the size of ordinary sawdust. When treated with water, alcohol, or ether, the weathered Brazilwood readily yields up its red coloring matter, called *brazilin*. Strong decoctions of Brazilwood are used by the dyer and calico-printer in the fabrication of reds, browns, etc. It is also used in the manufacture of red ink. Brazilwood as a dyestuff has been largely superseded by synthetic dyestuffs. See INK.

BRAZING, brāz'ing, or BRASS-SOLDERING. The process of uniting two pieces of brass, two pieces of copper, or one of each, by means of a hard solder, partaking more or less of the composition and properties of ordinary brass. (See ALLOYS.) The edges or parts of metal to be joined are first filed bright, so as to be thoroughly clean; then there is strewn over the gap or crevice a mixture of the solder and borax; and then heat is applied. In brazing, a form of solder appropriate to the kind of work is employed, those used for the purpose varying considerably in composition. (See SOLDER.) Most of these solders consist of alloys of copper and zinc, though sometimes tin and other metals are added. The various metals are fused together, allowed to cool, and then filed down to a coarse powder, in which the solder is used. The borax is employed to form a glaze over the brightened surfaces, and thus prevent the oxidation of the metal, which would seriously interfere with and even stop the operation. An outward coating or layer of charcoal is likewise serviceable in the exclusion of the air during the brazing of large pieces of metal. Where a very high heat is required in the process, a little powdered glass is mixed with the borax. The mixture of solder and borax may be applied dry, but it is better to moisten it with water, and to lay it on the filed surfaces with a spoon. The whole is then gently heated, when the water evaporates, and a crust of borax and solder is left. The work may now be strongly heated before the blowpipe, or over a clear fire, and at a bright-red heat the solder fuses and the zinc begins to burn with a pale-blue flame. At this stage the solder flushes or becomes liquid enough to permeate the joint or crevice; but should it be tardy in acting thus, several slight taps will insure the proper result. The whole is now cooled, and toward the close of this process the articles may be introduced into cold water for more rapid reduction in temperature. Pieces of metal which have undergone the process of brazing are so firmly united that they may be rolled and re-rolled without the parts yielding.

BRAZOS, brä'zôs (Sp., plur. of *brazo*, arm, so called on account of its being formed by the two confluents). One of the largest rivers of Texas, formed by the junction of Clear and Salt forks, in Young County (Map: Texas, G 5). It flows southeast in a tortuous course, and empties into the Gulf of Mexico about 40 miles to the southwest of Galveston. It is about 900 miles long and drains a very extensive area. It is navigable during high water for a distance of 300 miles from its mouth, and at all times to Columbia, 40 miles from the Gulf. It flows through a generally fertile country, the lower part of its course being through alluvial deposits.

BRAZOS DE SANTIAGO, dâ sän'tē-ä'gō. A port of entry in Cameron County, Texas, on the Gulf of Mexico, about 35 miles northeast of Brownsville (Map: Texas, F 6). It has considerable coasting and foreign trade, the latter being valued at about $210,000 annually, of which four-fifths are exports. A shifting sand-bar, which rarely admits vessels of over 10 feet draught, is a hindrance to the commerce of the port.

BRAZZA, brät'sä (Slav. *Brač*, from Lat. *Brathia*, *Brattia*, *Brachia*). The largest island of the archipelago forming a part of Dalmatia, Austria-Hungary, in the eastern part of the Adriatic Sea (Map: Austria, E 5). Area about 150 square miles. The surface is somewhat mountainous, but the soil is fertile, and olives, figs, grapes, and other southern fruit are cultivated on the slopes of the mountains, and grain in the lower portions. It has celebrated marble-quarries. Population, in 1900, 24,465. The chief town is San Pietro, with a population of 3239. The island forms a separate administrative division of Dalmatia.

BRAZZA, PIERRE-PAUL-FRANÇOIS-CAMILLE, Comte de (1825—). A French explorer, whose real name is Brazza-Savorgnani, born in Rome. He was educated at the French Naval Academy, and after becoming a naturalized French citizen, entered the navy in 1875. In the same year he obtained a subsidy from the Government, to enable him to explore the Upper Ogowai, in which expedition he reached the sources of the Alima River. On his return he learned of Stanley's explorations upon the Congo, and determined to open up, by way of the Ogowai and Alima rivers, a route parallel to the Congo, which should join that river below the Rapids. In 1879 he founded two stations as bases of supplies for his new route, one (Franceville) on the Upper Ogowai, the other (Brazzaville) on the Congo itself. In 1880 he made a treaty with King Makoko, who put his possessions under French protection, and ceded to Brazza the site for his station, Brazzaville. Some little while later he discovered a

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route by way of the Niari River which connected the village Ntambo with the coast. In 1882 he returned to Europe, but went back to Africa the following year, with the rank of lieutenant-commander. He then definitely undertook to make practical this route from the Congo to the sea by means of the Ogowai and Alima. He established a series of stations, completed his explorations of the rivers, and won over the natives to French allegiance. In 1886 he was made Commissioner-General of the Government in French East Africa. Reappointed in 1887, he inaugurated various reforms and introduced steam-launches on the Congo and the Ogowai. Illness compelled him to return to France, but in 1890 he accepted the appointment of Commissioner-General of the entire French Congo, with Gabun under his direct authority. In 1891 he made further explorations of the interior; and from then until 1897, when he went back to France, he was most active in the support of the French colonies, which he, more than any one else, had been instrumental in founding.

BREACH (ME. *breche*, fracture, from *break*, AS. *brecan*, just as speech is from *speak*). In military siege operations, a gap made in any of the defensive works of a fortified position or intrenchments, or in the walls or gates of a city. Before the introduction of modern high-power guns the most elaborate tactics were employed to obtain this result. Breaching batteries were used to destroy walls by directing and lodging the shot or cannon-balls in two vertical lines, from the parapet of the wall downward, and in a horizontal line, connecting the lower ends of those vertical lines, thus overturning the weakened part and enabling the besiegers to attempt an entrance by the breach so made. Notable and historic examples are to be found in the Peninsular War (1808-14), when at Badajoz 14,000 shot, fired from a distance of 450 yards, brought down 180 feet of wall in 104 hours. At Ciudad Rodrigo, 6700 balls, from a distance of 560 yards, reduced 105 feet of wall in 32 hours. At San Sebastian 13,000 shot brought down 100 feet of wall in 62 days from a distance of 620 yards. At Fort Pulaski (1862), in the Civil War, it is estimated that in breaching the brick wall of the fort, 110,600 pounds of metal from 36 guns struck it in the course of a two days' bombardment from an average distance of 1687 yards, making an average of 2500 pounds to the square foot. See SIEGE AND SIEGE-WORK; and FORTIFICATION.

BREACH. A legal term which signifies the violation of an obligation, whether voluntarily assumed or imposed by law. *Breach of close* is any unwarrantable entry upon another's land, and is synonymous with trespass to real estate. See TRESPASS. For *Prison Breach*, see that title.

BREACH OF CONTRACT is a failure to do anything which one is bound by contract to do. In every case it subjects the party who breaks the contract to an action for damages; and if it goes to the essence of the contract, that is, if it is a failure to perform some fundamental term or condition of the contract, it gives to the other party the right to be exonerated from performance on his part. In some cases, comparatively rare, it renders the party guilty of the breach liable to an equity action for specific performance (q.v.). It is not necessary to a breach of contract, it will be observed, that a demand be made for performance after it is due and such performance has been formally refused. Indeed, it is now settled both in England and in this country that one may be guilty of a breach of contract before the time for the performance of the terms of the contract arrives. For example: A person contracts to sell and convey certain property at a future time. Before that date, he notifies the other party that he will not carry out the contract, or he sells and conveys the property to a third person. He is liable for an 'anticipatory breach,' as it is called. This doctrine proceeds upon the theory that the parties to a contract have the right to the maintenance of it up to the time of performance, as well as to its performance when due. Consult the authorities referred to under CONTRACT.

BREACH OF THE PEACE. In early English law, this phrase appears to have been synonymous with breach of law or custom. If the act complained of violated a law or custom of the entire realm it constituted a breach of the King's peace; if a law or custom of a county, a breach of the sheriff's peace; if of a manor, a breach of the peace of the lord of the manor. In modern usage it signifies any act violative of public order, such as the disturbance of a lawful meeting; a riot; taking part in an unlawful assembly; engaging in a prize-fight; unlawful intrusion upon the lands of another; unlawfully discharging firearms in a public place; going armed in an unlawful manner, etc. Many acts otherwise innocent and lawful can be condemned by the law because of their tendency to produce disturbances of the public peace. A person who is shown to be likely to commit a breach of the peace may often be put under bonds to keep the peace.

BREACH OF PROMISE TO MARRY. Either party to a valid contract to marry can maintain an action for damages against the other party for an inexcusable breach of the engagement. If the contract is between a minor (q.v.) and an adult (q.v.), the former may recover for its breach, but the latter cannot; because a minor's contracts are voidable by him. It appears to be settled in England that bodily infirmity or unfitness of the defendant will not excuse his or her breach of this contract, although it will warrant the other party in refusing to perform the contract. In this country it has been held that incurable physical unfitness for the marital relation, arising subsequent to the betrothment, is a legal excuse for refusing to marry. If one party induces the other to enter into a contract to marry by fraudulent representations, the party defrauded may maintain an action in tort for the damages sustained. But ordinarily an action for breach of promise is a contract action, although it has many of the characteristics of a tort action. For example: at common law, the right of action does not survive the death of either party to the contract, in the absence of special damage to the personal estate of the deceased, such as expenditures made in contemplation of marriage and lost by reason of the breach: the plaintiff may recover punitive damages (q.v.); and under many modern statutes, the defendant is liable to arrest (q.v.) as though he were charged with a fraud, and if a judgment is recovered against him, execution (q.v.) may issue against his body. Lord Mansfield was of the

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opinion that actions for breach of promise to marry 'should be looked upon with a jealous eye,' and repeated attempts have been made in England to abolish them by act of Parliament. Although these attempts have been unsuccessful, it is declared by English writers that breach-of-promise suits have not borne as abundant harvests in England as in the United States. See MARRIAGE; BETROTHAL; and TORT; and the authorities there referred to.

BREACH OF TRUST is a violation by a trustee of any of his legal duties. It may render the trustee liable to respond in damages, or to removal from his trusteeship, or to criminal prosecution, according to the nature of his misconduct. Some modern statutes have so extended the crime of larceny (q.v.) as to include a breach of trust, if the latter consists in secreting, withholding, or otherwise converting to the trustee's own use, property which has come into his possession by virtue of his trusteeship. See TRUST; TRUSTEE.

BREACH OF WARRANTY. A breach of a contract of warranty. See WARRANTY.

BREAD (AS. *breād*, Icel. *brauf*, Ger. *Brot*, akin to AS. *breōwan*, Engl. *brew*, *broth*). Cereals of some kind or other have always made an important item of human food, and of all the forms in which they have been used bread has proved the most satisfactory. Wheat, rye, corn (maize), and oats are commonly used for bread-making; less commonly, barley, buckwheat, rice, etc. To prepare the grain for bread-making it is usually cleaned, crushed, and bolted to obtain a fine, soft powder called flour or meal. The flour is made into a dough with water, and baked. Sometimes the dough is made with milk, or milk and water. Salt is usually added, and often a little sugar and lard or butter. If the dough is fermented or leavened in any way before baking, the resulting product is called leavened bread. If no leavening agent is used, unleavened bread results. The common leavening agents are yeasts, both wild and cultivated, leaven, i.e. dough saved from a previous baking, and chemical mixtures or baking-powders. The bread most commonly eaten in the United States, and often called white bread, is made, whether at home or at a bakery, from some one of the high grades of wheat flour or from a mixture of two or more grades. It is usually leavened with yeast.

The primitive way of making bread was to soak the grain in water, subject it to pressure, and then dry it by natural or artificial heat. An improvement was to pound or bray the grain in a mortar, or between two flat stones, before moistening and heating. A rather more elaborate bruising or grinding leads to such simple forms of bread as the *oat cakes* of Scotland, which are prepared by moistening oatmeal with water containing common salt, kneading with the hands upon a baking-board, rolling the mass into a thin sheet, and then heating before a good fire or on an iron plate called a girdle, which is suspended above the fire. In a similar manner the barley, meal and pease-meal *bannocks* of Scotland are prepared. In Eastern countries, as well as in Scotland, wheat flour is kneaded with water and rolled into thin sheets called *scones*. The most interesting of the unleavened breads is, perhaps, the Passover bread, which has been used during Passover week by orthodox Jews from the time of Moses until now. It is simply a mixture of flour and water baked in small round cakes until it is dry and hard, and is not unlike plain water crackers. Pilot bread, or ship's biscuit, is another simple preparation of flour and water so cooked that it can be kept for almost any length of time. Crackers, or biscuits, as they are often called, especially in England, are varieties of unleavened bread. Milk, butter, lard, spices, dried fruits—anything or everything desired to give them particular consistency, color, or flavor—is mixed with the flour and water, and the dough is then passed through very ingenious cutting machines and quickly baked in a hot oven. Such crackers are a concentrated form of nourishment, as they contain little water in proportion to their bulk, and are fairly solid in consistency.

Leavened or fermented bread is rendered light and porous by the formation within it of carbonic-acid gas, which distends it. This process is brought about either (1) by the use of leaven or of yeast, which causes the carbonic acid to form by the action of fermentation; or (2) by the use of baking-powders, which supply the necessary carbon dioxide to the dough by chemical reaction. Leaven is simply dough, or a mixture of flour, which is in a state of fermentation. The knowledge of its action may have been accidentally discovered by attempting to combine with a fresh mixture dough which had been left over from a previous baking. It is probable that the use of leaven was first known to the Egyptians, that the Greeks as well as the Jews learned it from them, and that the Romans learned it from the Greeks. Through the Romans this knowledge was spread far and wide through the subject nations which came under their influence. This method of bread-making is still extensively employed in certain parts of Europe.

Great care and skill are required in the making of leavened bread. There is always danger that during the process of fermentation lactic acid and other products which are disagreeable to the taste will form along with the carbonic-acid gas; then, if the leaven stands too long, it will reach the state of putrid fermentation.

With the knowledge of the yeast-plant (see YEAST), which was first applied to beer-making, the method of making fermented bread has been changed by substituting yeast for decomposing dough. The action of the yeast-plant—like that of leaven—when brought into contact with flour and water is to develop carbon dioxide and alcohol; the latter passes off in the oven in the form of vapor, the former is largely retained in the dough. The lightness of the bread depends upon the amount of this gas which remains imprisoned in the dough and distends it; hence it is due to the tenacity with which the grains of flour cling together, or, in other words, to the stickiness of the flour. It is in this respect that the superiority of wheat flour over that from all other grains lies. The sticky gluten of wheat does not allow the gas to escape. For this reason the quality of bread made from less tenacious flour is improved by mixing with it a portion of wheat flour.

The chemical reactions concerned in bread-making and the conditions under which they are produced are easily understood. The process consists in adding to the flour and warm water

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the necessary amount of yeast. The yeast may be added directly or a preliminary ferment may be formed by mixing it with potatoes. If the latter method is employed, the yeast is put into a thin liquor, formed by mixing mashed potatoes with warm water, and the mixture is allowed to ferment for some time. The advantages claimed for the potato ferment are that "the yeast-cells are strengthened by the soluble nitrogenous matter of the potato, which acts as a yeast stimulant and enables a smaller quantity of yeast to hydrolyze a larger amount of starch. The yeast-cells then act very rapidly on the glucose thus produced from the starch and develop the alcoholic fermentation." The proportion of water required to mix with the dough and yeast to form the 'sponge' depends upon the quality of the flour, as the gluten flours take much more water than the starchy flours, but enough should be added to make the sponge as moist as can be molded readily with the hands. The dough should be thoroughly kneaded, so the yeast will penetrate to every part of the mass. It should then be allowed to stand in a warm place, for a proper temperature is an essential condition to the fermenting process. The most favorable temperature is from 70° to 75° F.; if it is allowed to rise above 90° acetic, lactic, and possibly other organic acids are liable to form; in other words, the bread sours. If, on the other hand, the temperature is too low, the process of fermentation will not take place. The yeast begins to act upon some of the starch of the flour, changing it to sugar, and then decomposing the sugar into carbon dioxide and alcohol. It is not until the second stage is reached, and the gas begins to form, that the action is visible. After the process has gone on for a time, until the whole mass is honeycombed, the dough should be subjected to a second thorough kneading, to break up the large gas-bubbles into many small ones and distribute them evenly through the mass of dough. The thoroughly kneaded mass is next molded into loaves and allowed again to 'rise.' As bread loses a portion of its nutritive properties each time it is molded, the process should not be repeated too often. Bread which has been kneaded only once has a sweeter flavor than that molded twice, but its texture is coarser and its appearance less attractive. The loss of nutritive value is from that portion of the starch which is converted into alcohol and gas.

When the bread is thoroughly kneaded the second time it is ready for the oven after rising. The best temperature for baking bread is from 450 to 550° F., so that the interior of the loaf will be at the boiling-point, or 212° F. During the process of baking the starch of the flour is rendered soluble by the heat, the fermenting growth is killed, and the alcohol formed by the fermenting action is driven off. The carbon dioxide is also expanded. By wetting the loaves before they are put into the oven, the crust is formed more rapidly, and the too rapid expansion of the dough is checked. Steam is sometimes injected into the oven while the bread is baking, thus glazing the crust and keeping the interior of the bread more moist. Baked bread consists of two portions, the crumb and the crust, which differ from each other both physically and chemically. These differences are due to the more sudden and intense heat to which the crust is subjected. The action of the heat and of the steam rapidly decomposes the starch into dextrin and maltose, which are caramelized by the heat, and so the surface takes on a brown color and a sweeter taste. The accompanying table shows the chemical difference between the crumb and crust of bread, according to the analyses of German and American investigators.

KIND OF BREAD		Water	Protein	Fat	CARBOHYDRATES			Ash
					Starch	Sugar	Dextrin, etc.	
Rye bread (German)	Crumb	46.4	8.9	.6	34.2	1.4	8.3	.....
	Crust	12.5	12.3	.6	53.5	4.2	16.0	.....
Wheat bread (German)	Crumb	40.6	6.5	1.0	40.3	2.5	8.9	.....
	Crust	13.0	9.3	.6	59.2	3.6	14.0	.....
Wheat bread (American)	Crumb	40.6	8.9	.5	49.7			.3
	Crust	22.3	11.4	.6	65.3			.4

That fermented bread is more healthful than unfermented is now generally admitted by physicians. Being porous, it is easily masticated and more thoroughly aërated during the process, so that the starch is more easily acted upon by the digestive fluids.

Good fresh bread has a crisp crust which breaks with a snap, and an elastic crumb which springs back into shape after being pressed with the finger. Before bread is a day old, however, its texture has changed; its crust has become softer and tougher, while the inside seems dry and crumbly; the bread is 'growing stale,' as we say. This was formerly supposed to be due simply to the drying of the bread; but as the loss of water is found by experiment to be comparatively slight, some other explanation is necessary and various ones have been offered, of which the most interesting seems that given by Boutroux. He maintains that the apparent dryness is due to a shifting of the moisture from the crumb to the crust. When first taken from the oven the dry crust cools quickly, but the moist crumb retains its heat much longer. As gradually, however, its temperature falls to that of the surrounding atmosphere, its moisture tends to pass outward, leaving a comparatively dry crumb and moist crust. Common experience shows that if stale bread is put into the oven for a few minutes it regains something of its fresh consistency—crisp crust and moist crumb. Such bread lacks the elasticity of the fresh loaf, and its interior crumbles as easily as before it was reheated. This is supposed to be because the starch has undergone a chemical change, the nature of which is not yet clearly understood. Indeed, the whole question of staleness is one about which little has been absolutely proved.

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The average percentage composition of a number of common kinds of bread is shown in the following table:

AVERAGE COMPOSITION OF A NUMBER OF DIFFERENT KINDS OF BREAD

KIND OF BREAD	Water	Protein	Fat	Carbo-hydrates	Ash
	%	%	%	%	%
Corn bread (johnnycake)	38.9	7.9	4.7	46.3	2.2
Rye bread	35.7	9.0	0.6	53.2	1.5
Rye and wheat bread	35.3	11.9	0.3	51.5	1.0
Wheat bread "gluten"	38.2	9.3	1.4	49.8	1.3
Wheat bread, "graham"	35.7	8.9	1.8	52.1	1.5
Wheat bread, "roll"	29.2	8.9	4.1	56.7	1.1
Wheat bread from high-grade patent flour	32.9	8.7	1.4	56.5	0.5
Wheat bread from regular patent flour	34.1	9.0	1.3	54.9	0.7
Wheat bread from bakers' flour	39.1	10.6	1.2	48.3	0.9
Wheat bread from low-grade flour	40.7	12.6	1.1	44.3	1.3
Wheat bread, average of a large number of analyses	35.3	9.2	1.3	53.1	1.1
Whole-wheat bread	38.4	9.7	0.9	49.7	1.3
Crackers	.....	10.7	8.8	71.9	1.8

It will be seen that wheat bread from low-grade flour, wheat bread from bakers' flour, and rye-and-wheat bread contain the largest amount of protein; corn bread and wheat rolls, the most fat; and wheat rolls, wheat bread from high-grade patent flour, and wheat bread from regular patent flour, the most carbohydrates. The amount of fat would, of course, vary greatly with the amount of shortening added in making the bread, and the examination of a large number of analyses of the same kind of bread has shown that the amount of each of the several nutrients varies in the same sort of bread within rather wide limits. Judged by their composition, all breads are nutritious foods, and too great stress should not be laid on the variations in composition between the different kinds.

The chemical composition of the finished loaf differs somewhat from that of the original material, as is shown by the following table, which compares flour and the breads made from it:

AVERAGE COMPOSITION OF WHITE BREAD AND OF THE FLOUR FROM WHICH IT WAS MADE

	Water	Protein	Fat	Carbo-hydrates	Ash
	%	%	%	%	%
Bread	35.3	9.2	1.3	53.1	1.1
Flour	12.0	11.4	1.0	75.1	0.5

The increase of water in the bread hardly needs explanation, since it is evidently due to the water added in making the dough. The use of butter or lard and salt probably accounts for the excess of fat and ash. The protein and carbohydrates lost doubtless went to nourish the yeast. Most of the carbon dioxide into which they were converted passed out of the bread. According to Birnbaum the baked bread contains an average of 0.314 per cent. of alcohol, by no means all of that generated by the yeast (about 1 per cent., according to Snyder); part is evaporated and part is probably changed into acetic acid. The bacteria and other microscopic plants which accompanied the yeast doubtless took their share of the protein and carbohydrates, returning a part in the form of the characteristic acids and other bodies which they produce. Part of the starch in the crust has been changed into dextrin, and that in the crumb has become gelatinous or partly soluble. The gluten has taken definite shape; in other words, it has coagulated very much as the white of an egg does in boiling.

EFFECT OF BAKING-POWDERS. Various mixtures of acid and soda called baking-powders (q.v.) are prepared by which carbonic acid may be introduced directly into the dough, instead of awaiting the slower process of fermentation. By this means there is no loss of nutritive qualities in the bread by decomposition, while in fermented bread this amounts to 1 per cent. One of the disadvantages of this method is that in the case of most of the acids used to liberate carbonic acid from soda, the reaction is instantaneous, and much of the gas is dissipated before the bread reaches the oven. Cream of tartar is the only acid substance which does not liberate the gas by simple contact in the cold; it is therefore best adapted to cooking. Another objection to this method of raising bread is that a residue of harmful salts may be left in the bread. Hence it is that the various baking-powders on the market should be used with caution. When cream of tartar and soda are put in separately by the cook instead of a baking-powder, care should be taken not to use an excess of the former, as the flavor may be injured and the product be unwholesome.

SELF-RAISING FLOURS are simply flours into which acid and soda preparations have been mixed in such proportions that the addition of water, by liberating the carbon dioxide, produces a spongy dough. Lightness is produced in bread or cake by the simple addition of well-beaten eggs, because the air is caught by the sticky albumen of the eggs and remains imprisoned in the dough. Air at 70° F. expands to three times its bulk when the temperature is raised to 500° F., and the whole mass of dough is expanded with it. If the heat of the oven is too intense when dough thus prepared is placed into it, the bubbles of air will swell so rapidly that they will burst, and the dough will fall.

Besides the ordinary white wheat bread, there are innumerable fancy white breads, breads made from flours other than wheat, and unleavened breads, on the market. So few analyses of them have been made, however, that they can hardly be more than enumerated here. Most like the ordinary bread are the fancy leaven white breads, such as Vienna and French rolls, milk breads, etc. These usually differ chiefly in the use of milk, sugar, butter, lard, etc., in the dough. Entire wheat, graham, rye, barley, or oatmeal flours are made into bread in essentially the same way as ordinary wheat flour, and vary in texture and nutritive value according to their original composition.

The original *graham bread*, made without yeast from graham flour according to the receipt of its inventor, and not to be confounded with raised graham bread, is made by kneading the flour and water thoroughly, and allowing the dough to stand several hours before baking. It is heavier

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than ordinary yeast bread, but still is somewhat porous, owing probably to fermentation started by bacteria accidentally present in the flour and acquired from the air; it is sweet and by no means unpalatable, but probably the nutritive value of its protein is lower than Dr. Graham supposed.

Gluten bread, if properly made, contains the gluten of the flour, from which more or less of the starch has been removed. To make it, strong flour and water are made into dough, which is pressed and strained under a stream of water until the starch has been worked out; it is then kneaded again and baked. It makes a light, elastic loaf, frequently prescribed for diabetic patients, from whose diet it is considered desirable to exclude starch.

The *aërated bread* so popular in London is made by a method invented by the English physician Dauglish in 1856. According to this method, the water used for wetting the dough is directly charged with the requisite amount of carbon dioxide gas and then mixed with the flour in a specially constructed machine. The flour is inclosed in a tight box, moistened with the charged water, thoroughly kneaded by machinery, molded into loaves and put directly into the oven. The advantages claimed for this form of bread are: (1) There is no loss of flour through fermentation; (2) the process is much more rapid; (3) the cost of machinery and gas is less than that of yeast; (4) the process is more sanitary, the bread requiring no handling; (5) the bread is absolutely pure, containing only water, flour, and salt. Sometimes a little fermented barley infusion, or wort, as it is called, from a brewery, is put into the water. This aids it in absorbing the gas, renders the gluten more elastic, and improves the flavor of the bread.

The so-called *salt-rising* bread is interesting as an illustration of self-raised bread. In it the ferments originally present or acquired from the air produce the fermentation which leavens it. To make it, warm milk and cornmeal are mixed together into a stiff batter, which is left at blood heat until the whole mass is sour; that is, until the ferments present have produced fermentation throughout. Next a thick sponge is made of wheat flour and hot water, in which a little salt has been dissolved. This sponge and the sour batter are thoroughly kneaded together and set in a warm place for several hours. The leavening action started in the batter spreads through the dough and produces a light, porous loaf, which many persons consider very palatable. Such bread is quite free from acidity, as the presence of the salt prevents undesirable fermentation.

Various forms of 'raised biscuits,' 'hot bread,' etc., are made in the household by adding shortening, milk, eggs, etc., to the dough, or by modifying in some way the process followed. Using soda and cream of tartar, or baking-powder, in making biscuits, shortcakes, etc., the process is intrinsically the same as in making ordinary white bread, except that the baking-powder or its substitute does the work of the yeast. Such breads do not require to be kneaded or set to rise, and bake very quickly, hence are very convenient when yeast is not obtainable or time is limited. They never become so light and porous as yeast-made bread, however, and dry very quickly.

An interesting variety of bread made without leavening is known as *Maryland* or *beaten* biscuit. A rather stiff dough is made from flour and water, or milk, with shortening and salt added. It is kneaded and then beaten or pounded, being frequently turned over and over until it looks light and puffy. The biscuits are then formed and baked. The folding and pounding of the dough incloses small quantities of air in numberless little blisters. These expand in baking and make the biscuit light and porous. The different kinds of bread from other grains than wheat, as 'corn bread,' 'brown bread,' 'rye bread,' 'gems,' etc., which are made in many households, vary somewhat in different regions, but they all follow the same principles which govern the bread-making from wheat flour; that is, the flour or meal is mixed to a dough with water or milk, and some leavening substance is generally added to make the dough porous. Eggs, sugar, shortening, etc., may be added, giving rise to the numerous varieties with which we are all familiar.

Digestibility. The digestibility of bread is a very important matter, which has been often studied by methods of artificial digestion and by experiments with man. Among the best known of the latter are those conducted by Meyer and Voit, of Munich. Four kinds of bread were used: (1) Rye bread, raised with a leavening powder; (2) bread made from a mixture of rye and wheat flours, and raised with yeast; (3) fine white bread raised with yeast, and (4) coarse whole-wheat bread, which the Germans call 'pumpernickel,' raised with yeast. The third of these—fine white bread—yielded the highest percentage of digestible nutrients; next came the wheat and rye bread; then the bread raised with leavening powder, and last, the pumpernickel, which is too coarse to be justly compared with whole-wheat bread such as is made in the United States. The fine white bread was the lightest; next to it stood the rye and wheat, and next, that raised with the powder; the same order these breads took with regard to digestibility. These experiments show, not so much the comparative value of different flours, as that the digestibility of bread depends largely upon its lightness.

A number of experiments have been recently made, especially by Snyder, and by Woods and Merrill, on the digestibility of bread from different grades of flour ground from the same lot of wheat. The average result of a number of such experiments follows:

Digestibility of Bread from Different Kinds of Flour

Kind of flour	Protein	Fat	Carbo-hydrates	Energy
	%	%	%	%
White bread from standard patent flour	85.3	56.4	97.5	90.1
Entire-wheat flour bread	80.4	55.8	94.1	85.5
Graham bread	77.6	58.0	88.4	80.7

According to the chemical analysis of graham, entire-wheat, and standard patent flours milled from the same lot of hard Scotch Fife spring wheat, the graham flour contained the highest and the patent flour the lowest percentage of

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total protein. (See WHEAT.) But according to the results of digestion experiments with these flours the proportions of digestible or available protein and available energy in the patent flour were larger than in either the entire-wheat or the graham flour. The lower digestibility of the protein of the latter is due to the fact that in both these flours a considerable portion of this constituent is contained in the coarser particles (bran), and so resists the action of the digestive juices and escapes digestion. Thus, while there actually may be more protein in a given amount of graham or entire-wheat flour than in the same weight of patent flour from the same wheat, the body obtains less of the protein and energy from the coarse flour than it does from the fine, because, although the including of the bran and germ increases the percentage of protein, it decreases its digestibility.

The digestibility of first and second patent flours, as shown by experiments made at the same time as those noted above, was not appreciably different from that of standard patent flour. The degree of digestibility of all of these flours is high, due largely to their mechanical condition; that is, to the fact that they are finely ground.

Judged both by composition and digestibility, good bread is a wholesome, useful food. As compared with most meats and vegetables, bread has practically no waste, and is quite completely digested. It is too poor in protein to be fittingly used alone, but when used with due quantities of other foods, it is invaluable, and well deserves its title of 'the staff of life.' Statements of a popular nature are frequently met with on the unwholesomeness of hot bread. The fact that bread is hot has doubtless little to do with the matter. New bread, especially that from a large loaf, may be readily compressed into more or less solid masses, and it is possible that such bread would be much less finely masticated than crumbly, stale bread, and that, therefore, it might offer more resistance to the digestive juices of the stomach. However, when such hot bread as rolls, biscuit, or other form in which the crust is very large in proportion to the crumb, is eaten, this objection has much less force. There is little difficulty in masticating the crust, and it is doubtless usually finely divided.

IMPERFECTIONS AND IMPURITIES IN BREAD. One of the most common and dangerous faults in bread is heaviness and sogginess. In wheat bread this may be caused by the use of cheap flours, poor in gluten, which cannot absorb all the water put into the dough, or, to state it another way, by the use of too much water in proportion to the flour; by too little or by too poor yeast, or by insufficient kneading, rising, or baking. Heavy bread is popularly considered one of the most indigestible of foods. When chewed it rolls itself into solid lumps, which give the saliva and gastric juices very little chance to work upon them.

Occasionally the crumb of fresh bread breaks when cut, instead of separating cleanly under the knife. According to Jago, harsh, dry flours, not sufficiently fermented, may be the cause of this, or the dough may have lost its tenacity by being overworked. Another common fault in bread, especially in bakers' bread, is a crumb full of large, irregular holes instead of the small, even pores which it should show. These occur in overkneaded or overraised dough, or if they are found just below the crust they indicate that the oven was too hot and that the crust formed before the carbon dioxide had finished expanding.

Sometimes bread-makers are troubled by what is known as 'sticky' or 'slimy' bread. In such cases bread three or four days old takes on a light-brown color and a peculiar taste and odor. Gradually, too, it becomes sticky or slimy, until it may be pulled into strings, sometimes several feet in length. The trouble appears to be caused by the common potato bacillus (*Bacillus mesentericus vulgatus*), a minute organism which finds its way into the materials of the dough, survives the baking, and, growing in the bread, causes it to decompose.

Recent experiments show that the bacilli enter the bread with the yeast, which in the cases investigated was a variety of the compressed yeasts ordinarily on the market. It was also proved that the bacilli will survive the heat of baking. Accordingly, if yeasts are not carefully made, such trouble may occur at any time, but especially when the weather is warm and favorable to the growth of the bacilli. The best safeguards are to keep the bread in a cool place and to bake only as much as can be consumed within a day or two.

Not infrequently, especially in damp weather, mold forms on the outside, or even in the inside of bread. Mold, like yeast, is a minute plant whose spores (or seeds) are floating about everywhere in the air, ready to settle down and grow wherever they find a moist, suitable home for themselves. The best practical way to protect bread from them is to keep it in a dry, air-tight box.

But all these faults seem insignificant compared with sour bread. This is due to acetic, lactic, or, in the worst cases, butyric acid given off by undesirable bacteria, which get into the bread with the yeast or in some other way.

Besides these acid-producing bacteria, various others may occur in bread, mostly harmless, but some of them very curious in their effects. Most striking among these is the *Micrococcus prodigiosus*, a minute organism which makes blood-red spots in the dough and whose presence gave rise to many interesting superstitions during the Middle Ages.

The adulterants most commonly met with in bread are mineral salts mixed into the dough for the purpose of producing a good-looking loaf from poor flour. Alum is the most common of these. Soda is often used in bread to prevent souring, and, as it does not lessen the value, can hardly be called an adulterant. In breads made from special flour, poor in gluten—oatmeal, barley, etc.—soda is regarded as necessary in the production of a sweet, well-raised loaf. See also BARLEY; BUCKWHEAT; FLOUR; MAIZE; RICE; RYE; WHEAT; ADULTERATION.

For further information consult: Jago, *The Science and Art of Bread-Making* (London, 1895); Church, *Food Grains of India*, with supplement (London, 1901); Boutroux, *Le pain et la panification* (Paris, 1897); Goodfellow, *Dietetic Value of Bread* (London and New York, 1892); Rorer, *Bread and Bread-Making* (Philadelphia, 1899); Von Bibra, *Die Getreidearten und das Brod* (Nuremberg, 1861); Section on Bread-Making, Richards, *Chemistry of Cookery* (Boston, 1894); Abel, *Practical Sanitary and Economic Cookery*

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(Rochester, 1890); Sadtler, *Organic Chemistry* (Philadelphia, 1900); United States Department of Agriculture, Office of Experiment Stations, Bulletins Nos. 35, 52, 67, 85, and 101; United States Department of Agriculture, Farmers' Bulletin No. 112.

BREAD-AND-CHEESE FOLK. A term applied to the Dutch peasants who seized Haarlem in 1492. They were shortly after defeated by Albert, Duke of Saxony. The rebellion had arisen from the latter's withdrawal of the city's privileges.

BREADFRUIT TREE, *Artocarpus incisa.* A tree of the order Moraceæ, a native of the islands of the Pacific Ocean and of the Indian Archipelago. It is one of the most important natural products of these regions, its fruit supplying food, and its inner bark a material for making clothing, while its timber and its milky juice are also employed for economic purposes. The bread tree is a rather slender tree, 40 to 30 feet high, often rising almost half its height without a branch. It has large pinnatifid leaves, frequently 12 to 18 inches long, dark green, and glossy. The fruit is generally oval, or nearly spherical, and about the size of a child's head. It is a sorosis, a compound or aggregate fruit formed from numerous flowers on a common axis, and is covered with a roughish rind, which is marked with small square or lozenge-shaped divisions, having each a small elevation in the center; it is at first green; when imperfectly ripened, brown, and when fully ripe assumes a rich yellow hue. It is attached to the small branches of the tree by a short thick stalk, and hangs either singly or in clusters of two or three together. It contains a somewhat fibrous pulp, which, when ripe, becomes juicy and yellow, but has then a rotten taste. At an earlier stage, when the fruit is gathered for use, the pulp is white and mealy, and of a consistence resembling that of new bread. In a still less mature state, the fruit contains a viscous white milk. The common practice in the South Sea Islands is to cut each fruit into three or four pieces, and take out the core; then to place heated stones in the bottom of a hole dug in the earth, cover them with green leaves, and upon this to place a layer of the fruit, then stones, leaves, and fruit alternately, till the hole is nearly filled, when leaves and earth to the depth of several inches are spread over all. In rather more than half an hour, the breadfruit is ready; "the outsides are, in general, nicely browned, and the inner part presents a white or yellowish cellular pulpy substance, in appearance slightly resembling the crumb of a wheaten loaf." It has little taste, but is frequently sweetish, and more resembles the plantain than bread made of wheat flour. It is slightly astringent, and highly nutritious. Sometimes the inhabitants of a district join to make a prodigious oven—a pit 20 or 30 feet in circumference, the stones in which are heated by wood burned in it, and many hundred breadfruits are thrown in, and cooked at once. Baked in this manner, breadfruit will keep good for several weeks. Another mode of preserving it is by subjecting it in heaps to a slight degree of fermentation, and beating it into a kind of paste, which, although rather sour, is much used when fresh breadfruit cannot be obtained. There are numerous varieties of the bread tree in the South Sea Islands, and they ripen at different seasons, the most highly prized being seedless. The tree produces two, and sometimes three, crops a year. In the West Indies and South America, into which it has also been introduced, the breadfruit has not come much into use as an ordinary article of food; but various preparations of it are reckoned delicacies. The fibrous inner bark of young breadfruit trees, beaten and prepared, is used for making a kind of cloth, which is much worn by the common people in the South Sea Islands, though inferior in softness and whiteness to that made from the Paper Mulberry. There exudes from the bark of the bread tree, when punctured, a thick, mucilaginous fluid, which hardens by exposure to the air, and is used, when boiled with cocoanut oil, for making the seams of canoes, pails, etc., water-tight, and as bird-lime. The timber is soft and light, of a rich yellow color, and assumes, when exposed to the air, the appearance of mahogany. It is used for canoes, house-building, furniture, and many other purposes. It is durable when not exposed to the weather. The Jack (q.v.) or Jaca (*Artocarpus integrifolia*), and the Dephal (*Artocarpus lakoocha*), both large East Indian trees, belong to the same genus with the breadfruit tree.

BREAD-NUT. The fruit of *Brosimum alicastrum*, a tree of the natural order Artocarpaceæ, and therefore allied to the breadfruit, a native of Jamaica. The genus Brosimum is distinguished by male and female flowers on separate trees, in globose catkins. The fruit is a one-seeded drupe. The breadnut tree abounds in a tenacious, gummy milk. The nuts, boiled or roasted, form an agreeable article of food and are eaten instead of bread. Their taste resembles that of hazelnuts.

BREADROOT. See PSORALEA.

BREADTH. The term in art which denotes the quality through which grandeur and simplicity of effect is obtained. In painting, when the play of light upon an object, a group of objects, or a scene, is so managed that the effect is direct and carrying, the work is spoken of as possessing breadth. Mere outline does not so much contribute to this result as do light, and shade, and color. It is arrived at often through the suppression of unnecessary detail; still, finish does not preclude, or negligence produce it. Its secret is intelligent vision, and the truthful recording of seen things. Rembrandt in portraiture is a good exemplar of this quality of breadth. Critics of painting often speak of an artist as having a broad touch. This is not close enough to define the meaning of breadth in a large sense; the painter must also possess breadth of vision. Sculpture, too, demands this quality of breadth, and it is achieved in modeling by producing such forms that the light in striking a plastic mass is not so broken by petty forms as to destroy the simplicity and dignity of a figure or group of figures as a monumental whole. The human mind, indeed, is distracted and disturbed, unconsciously, perhaps, in contemplating a so-called work of art in which this quality does not exist.

BREAKER. A wave of which the surface is broken, usually by the nearness of the bottom to the water surface. A wave which is of little height in deep water will often increase in height as the depth lessens and finally break into foam.

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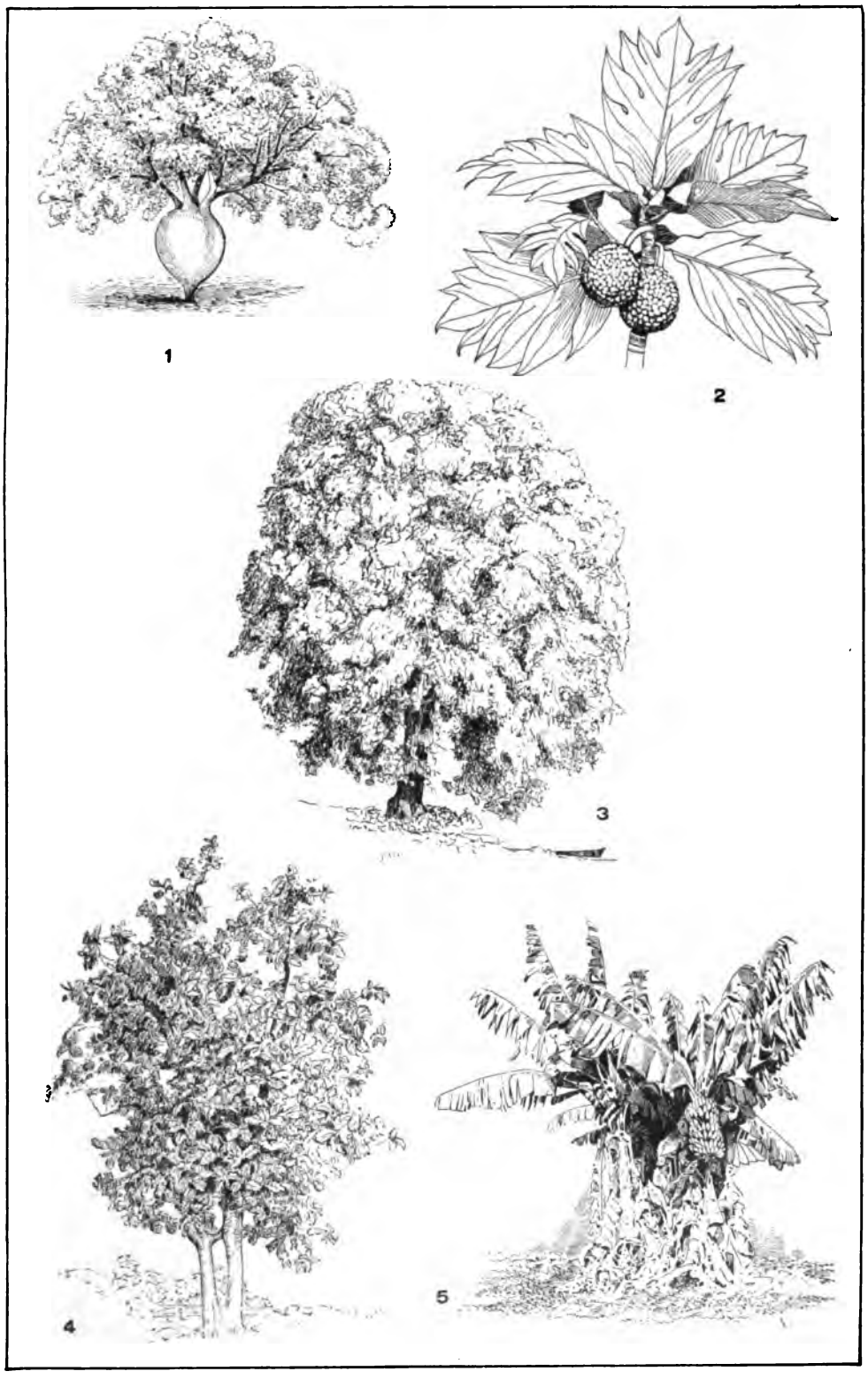

1. BOTTLE TREE (Sterculia).
2. BREADFRUIT (Artocarpus incisa).
3. BRAZILNUT TREE (Bertholletia excelsa).
4. BREADFRUIT TREE.
5. BANANA (Musa sapientum).

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Shoals are invariably covered with breakers in heavy weather, and a very moderate swell will break over rocks or shoals only a few feet below the surface. The calls *breakers ahead, on the lee bow, on the starboard bow,* etc., indicate that breaking waves are seen in the direction indicated; breakers often serve as a warning of a shoal which might be unnoticed in a very smooth sea.

BREAKING BULK. A breaking open of a package, bundle, box, or the like, of chattels, and appropriation of the contents thereof to the uses of the person who breaks it open in such a manner as to amount to a conversion, a violation of the rights of the owner, or the like. At common law, a bailee who received goods inclosed in a box or a package was not liable for trespass or theft if he sold the box or package and its contents; but if he broke open the box or package, and sold a part or all of the goods, he was criminally liable. The reason for this distinction seems to have been that the bailor delivered possession of the box or package to the bailee, but he did not deliver possession of the goods inside. Hence, when the bailee sold and delivered the box or package there was no wrongful taking, but there was when he broke open the box or package and disposed of the contents which had not been delivered into his possession. Modern legislation in England and many of the United States has abolished this distinction, and has declared the fraudulent conversion of the bailor's goods by the bailee to be larceny (q.v.), whether attended by breaking of bulk or not. See BREACH; LARCENY; CONVERSION; SALE; and consult the authorities there referred to.

BREAKWATER (anything that breaks the force of the waves). A barrier intended for the protection of shipping in harbors and anchorages. It sometimes happens that in front of a semicircular bay a small island is so situated as to form a natural breakwater. This is to some extent the case with the ports of Portsmouth and Southampton, England, which are protected from the south by the Isle of Wight. In most places, however, bays and harbors are without such natural protections, and it is often found necessary to construct artificial breakwaters to prevent the entrance or formation of waves from the sea to disturb the shipping anchored within. It is with the design and construction of these artificial breakwaters alone that we shall deal here.

Breakwaters may be divided into two main groups: (1) Those which give shelter and protection to commercial harbors or their entrances, and (2) those which shelter an anchorage or roadstead for vessels in transit which have occasion to escape from the violence of passing storms. Such anchorages are usually termed harbors of refuge. (See HARBORS.) Each of these two classes may be technically further divided, according to their particular type of construction. To discuss in the case of each of these types its theory of action and conditions of application, involves technicalities which are suitable only for special engineering treatises, but a brief definition of each is possible. The types are as follows: (1) Attached breakwaters are those which project from a cape or headland; (2) insular breakwaters are those which are wholly detached from the mainland; (3) permanent breakwaters are those which are rigidly supported on the bottom of the sea (the majority of breakwaters are insular and permanent); (4) floating breakwaters are those which are upheld by the water, being simply anchored to the sea bottom; these are seldom employed; (5) reaction breakwaters are those so constructed that the outer slope breaks the surface of the waves, while the inner slope regulates the currents; (6) composite breakwaters are those which consist of an upright wall resting on a comparatively wide and flat mound of loose stones. Examples of each of these types will be described below.

The design and position of a breakwater in all cases are determined by the direction and amount of wave-force which it will have to resist. Generally speaking, the height and force of the impinging waves in any locality depends upon the force and direction of the winds, the depth of the water, the *fetch* or distance over which the waves move, and the angle of incidence at which they strike the breakwater. Some very notable instances of wave-force are on record. In the Wick Bay Breakwater, in England, a concrete block 45 feet wide, 26 feet long, and 21 feet high was completely turned around on its base and finally tipped off its foundation. This block weighed 1330 tons and formed the end of the breakwater. It was replaced by a larger block weighing 2600 tons, which was in turn carried away by the waves. Experiments made by Thomas Stevenson, an English engineer, by means of marine dynamometers to record the pressures, showed pressures of 6000 pounds per square foot in the North Atlantic Ocean, and of 3000 pounds per square foot in the German Ocean. At the time that the beacon at the mouth of the River Loire, in France, was destroyed, M. Le Fernie calculated that the wave-force impressed upon the work must have exceeded 4800 pounds, and approximated 6000 pounds, per square foot. To determine the wave-pressure on the breakwater in Lake Ontario at Oswego, N. Y., Mr. Wm. P. Judson, civil engineer, attached dynamometers to its face at the water's surface, at 8 feet below the surface, and at 8 feet above the surface. The pressures recorded were: At 8 feet below the surface, 10 pounds per square foot; at the surface, 600 pounds per square foot; and at 8 feet above the surface, 1000 pounds per square foot. The foregoing are isolated instances of wave-pressures, and cannot be assumed to be of general application; they serve simply to convey some idea of the forces imposed upon breakwaters by action of waves. In closing this reference to wave-pressures, it should be carefully noted that the angle at which the waves strike the breakwater has much to do with the pressures exerted. For example, by reducing the angle at which the waves struck the Wick Bay Breakwater from 90° to 80°, the structure withstood safely the action of the waves which previously had repeatedly destroyed it. From this brief consideration of the wave-force acting upon a breakwater, it is evident that its design from the standpoint of stability must depend upon conditions arising from the location of the work.

In considering typical examples of breakwaters, one of the largest and most expensive is the Cherbourg Breakwater, which was built to protect the crescent-shaped bay forming the great French naval port of Cherbourg. Its con-

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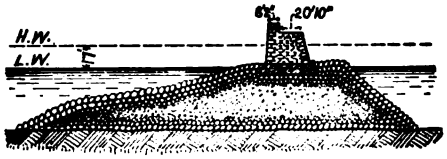
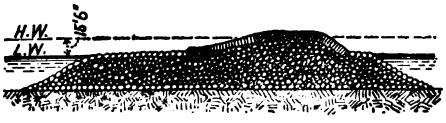
struction was begun in 1786-88 by sinking 18 timber frustums of cones having a diameter of 142 feet at the base and 113 feet at the top, and a vertical height of 65 feet, which allowed them



CHERBOURG (FRANCE) BREAKWATER.

to project from 6 feet to 10 feet out of water when sunk. These timber frameworks were submerged at irregular intervals by filling them with stone, so that they formed a row nearly 2½ miles long. About 3,703,703 cubic yards of loose stone were deposited in and around these cones. This original construction cost about $4,512,200, but the experiment proved unsuccessful, as the cones were battered into pieces by the waves, leaving only a series of mounds of loose stone, the tops of which were eventually below water-level. The work remained practically in this condition until 1830, when it was decided to make the loose stone mounds continuous by filling between them, and to construct on this ridge a masonry wall rising from low-water level, 36 feet 3 inches wide at the bottom and 29 feet 3 inches high, and 8 feet 3 inches wide at the top. It was built of rubble masonry, with a dressed stone facing. Since the construction of this original wall considerable work has been done in the way of strengthening and raising the rubble base and the wall.

Plymouth Sound or Harbor, being open to the sea, was so much exposed to storms that early in the last century it was determined to construct a breakwater across its mouth, with openings between it and the shore on either side, for the ingress and egress of shipping. The works were commenced in 1812. The operations consisted in transporting along a tram-road large blocks of limestone procured from a neighboring quarry, shipping them in vessels fitted with trap-doors, and depositing them in the shape of a huge mound in the required situation. As soon as the stones began to appear above water, a perceptible benefit resulted in the relative calmness of the Sound during the prevalence of storms; but the structure was frequently very roughly



PLYMOUTH (ENG.) BREAKWATER.

handled by the waves, which altered and flattened its shape. A severe storm in November, 1824, threw a great portion of the stones over into the Sound. It was not until 1841 that the works were finally completed by the deposition of more than 3,000,000 tons of stone, and the total expenditure of nearly $7,500,000. The breakwater is nearly a mile long; the central portion is 1000 yards; and two wings of 350 yards each extend from the ends of this at a slight angle. The open channels at each end, between the breakwater and the shore, are each about half a mile wide, and their depth is respectively 40 and 22 feet at low water. The breakwater is 133 yards wide at the base, and 15 at the top, the two sides being made very sloping for the security of the stones. The slopes and top are faced with masonry. The water-space protected by this breakwater comprises 1120 acres.

To convert Holyhead Bay, Wales, into a harbor of refuge, an attached breakwater 7860 feet long was constructed, consisting of a loose stone base capped by a wall of solid masonry about 40 feet high, and, including the 40 feet wallway, about 60 feet wide. The method of construction was to convey the stone quarried from Holyhead Mountain out on a trestle in cars and dump it into the sea until the mound reached the proper

HOLYHEAD (WALES) BREAKWATER.

height. To form the sea end or head of this breakwater, a masonry platform 50 feet wide and 150 feet long was constructed, and on it a lighthouse was erected. The breakwater was begun in 1847 and finished in 1873 at a cost of over $815 per linear foot. This breakwater incloses an inner harbor of 267 acres and shelters an outer roadstead of 400 acres.

The Portland (England) Breakwater was built to convert the expanse of water between the English mainland and the isle, or rather the peninsula, of Portland into a harbor of refuge. An act of Parliament was obtained in 1847 authorizing the work. The breakwater, starting from the northeast point of the isle, stretches nearly due north for more than 8100 feet, with one intervening opening 400 feet long for the ingress

PORTLAND (ENG.) BREAKWATER.

and egress of shipping. The works were conducted more easily than those of any other great breakwater, for the isle contains an abundance of stone easily quarried, and the steep shores afforded facility for transporting the stones by their own gravity to their destination. The work, which is an upright ashlar superstructure, with a parapet founded on a mound of rubble stones, was done chiefly by convict labor; the depth is about 50 feet at low water. From the nature of the operation, any part of the breakwater became useful as soon as constructed. The width of the rubble mound at the bottom is 340 feet. This breakwater was constructed between 1849 and 1871, and contains a volume of 4,245,185 cubic yards of rubble stone.

Dover Breakwater, in England, is particularly interesting as being built of solid masonry throughout, the work under water being done by divers. The interior of the structure consists of concrete blocks and is faced with cut stone masonry. The work was begun in 1847, and in

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1888 the structure had reached a length of 2100 feet. Since 1893 work has been in progress extending this breakwater 580 feet, and in building a second structure of similar type 1500 feet long. The depth of water in which this breakwater is being built is about 45 feet. A conspicuous French example is to be found at Brest, the commercial harbor of which, completed about 1897, contains a breakwater half a mile long.

NEW DELAWARE BREAKWATER.

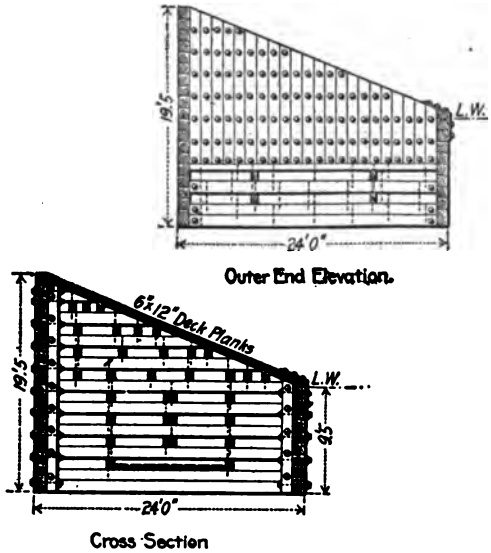
Delaware Breakwater for the national harbor of refuge in Delaware Bay (U. S.) is 1½ miles long, and is constructed in from 13 feet to 53 feet of water. It consists of a mound of rubble stone rising to low-water level, and above this of a rough wall of very large stones laid in courses without mortar, and with the interstices filled with small stone. This structure will shelter 552 acres with a minimum depth of 30 feet, and 237 acres with a minimum depth of 24 feet, the combined area being capable of sheltering 1000 vessels at once.

The Sandy Bay Breakwater for the national harbor of refuge at Sandy Bay, Mass., begun in 1885 and still in progress (1901), will be 9000 feet long, and inclose an area of 1377 acres with a minimum depth of 24 feet. Below a point about 15 feet below low water this breakwater consists of rubble stones not exceeding in weight 4 tons each, and above this point it consists of stones weighing not less than 4 tons each, and averaging 6 tons each. The estimated cost of this breakwater is $5,000,000. The breakwater at Point Judith, R. I., begun in 1890, and still in progress, will be 10,000 feet long, and is estimated to cost $1,200,000. It is being built of rubble stone to a depth of from 18 feet to 30 feet of water. The proposed breakwater for the deep-water harbor of San Pedro, Cal., will be 8500 feet long, constructed of rubble stone in water from 19 feet to 51 feet deep, and is estimated to cost $2,901,000.

sisting of a concrete superstructure resting on a rubble-stone base. Several of the most important of these structures are briefly described in the accompanying table, rearranged from a table published by Mr. Louis Y. Schermerhorn, civil engineer, in a report to the United States Government.

The first five of these structures are of peculiar construction, in the respect that the concrete superstructure is built of blocks resting on the rubble base at an inclination from the vertical, and having their tops bound together by a superimposed mass of concrete. This construction is supposed to permit the blocks to settle independently without destroying the integrity of the structure as a whole.

The Presque Isle Point Breakwater, near Marquette, Mich., on Lake Superior, is a timber crib structure filled with stone. The cribs were each 24 feet wide and 50 feet long, and varied in



PRESQUE ISLE BREAKWATER, LAKE SUPERIOR.

depth to suit the varying depth of water. These cribs were framed with solid 12 × 12-inch timber side walls, solidly bound together with 12 × 12-

LOCALITY	Base of superstructure below M. L. W., feet	Top of superstructure above M. L. W., feet	Total height of superstructure, feet	Width of superstructure, feet	Range of tides, feet	Height above high water, feet	Depth of water over site, feet
Colombo, Ceylon, Indian Ocean.....	* 20	12	32	34	2.0	10	18–40
Madras, India, Indian Ocean.....	22	8	30	24	3.3	4.7	24–45
Mormugao, India, west coast.....	† 18	‡ 20	38	30	6.0	14	20–28
Manora, India, Arabian Sea.....	15	9	24	24	8.7	0.3	18–30
Kustendje, Rumania, Black Sea.....	† 16	12	28	12–18	.....	12	12–20
Odessa, Russia, Black Sea.....	22	10	32	22–28	.....	10	20–30
Fiume, Austria-Hung'y, Adriatic Sea	22¾	.....	24	23½	1.5	1.5	20–70
Ymuiden, Holland, North Sea.....	† 25	18	43	28–38	5.5	12.5	10–30

* Rubble and 10-ton bags of concrete extend about 5 ft. above the base.
† Sea-face and slope protected with large concrete blocks.
‡ Includes a parapet 7 ft. high and 15 ft. thick.

Before passing to a description of a few typical breakwaters at the Great Lake ports in the United States, some mention should be made of a number of important ocean breakwaters con-

inch cross-ties 24 feet long, running from wall to wall and dovetailed at the ends. Timbers 6 × 12 inches and 24 feet long tie the walls of the cribs lengthwise. These cribs were sunk close to-

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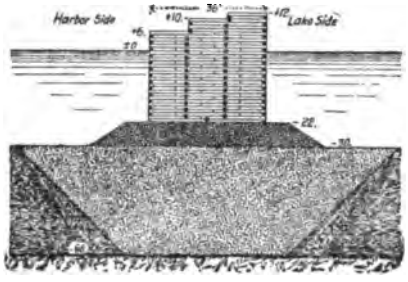
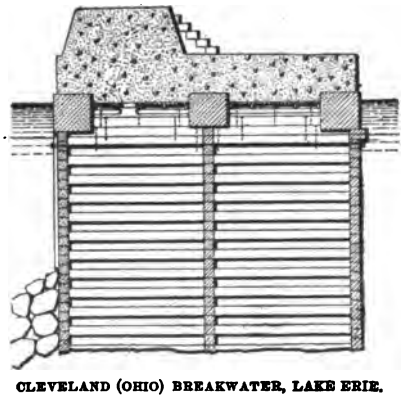
gether, end to end, fastened to each other and filled with stone. After filling, the tops of the cribs were covered with a continuous plank decking. The cost of this breakwater was $32 per linear foot. At Buffalo, N. Y., in Lake Erie, a



BUFFALO (N. Y.) BREAKWATER, LAKE ERIE.

new breakwater now under construction is a timber crib structure filled with stone. At this point the depth of water is 30 feet, and the lake bottom is covered with mud about 38 feet thick. The method of construction is to dredge a channel through this mud to hard bottom and fill it with gravel, and to found the timber cribs on this filling. While the timber crib structure is the standard breakwater construction for the Great Lake ports, the practice has become familiar in recent years, when repairing such structures, to remove the timber work to a safe point below low water and replace it by a superstructure of concrete. A notable example of this class of work is found in the new breakwater at Cleveland, Ohio.



CLEVELAND (OHIO) BREAKWATER, LAKE ERIE.

Floating Breakwater.—The use of floating structures of iron or wood has often been suggested for breakwaters, but they have seldom been used. The idea generally has been to anchor the structures at intervals, so that the waves striking against them would become disintegrated or deflected.

Further information on breakwaters may be obtained by reference to the following works: Vernon-Harcourt, *Harbors and Docks* (London, 1885); *Proceedings of the Institution of Civil Engineers* (London, 1838, current); *Reports of the Chief of Engineers, United States of America* (Washington, 1860, current); Cresy, *Encyclopædia of Civil Engineering* (London, 1847); *Engineering News* (New York, 1877, current); Spon, *Dictionary of Engineering* (London, 1880-81); Stevenson, *The Construction of Harbors* (New York, 1886); De Cordemoy, *Les portes modernes* (Paris, 1900). See also the article HARBORS in this Encyclopædia, in which are included maps showing the harbors formed by a number of the above-mentioned breakwaters.

BRÉAL, brā'ăl', MICHEL JULES ALFRED (1832—). An eminent French philologist, born at Landau (Rhenish Bavaria). He was educated at Weissenburg, Metz, the Lycée Louis-le-Grand (Paris), and Berlin. In 1864 he was appointed professor of comparative grammar at the Collège de France; in 1875 was elected to the Academy of Inscriptions and Belles-Lettres, and from 1879 to 1888 was an inspector-general of higher education. His publications include *L'étude des origines de la religion Zoroastrienne* (1862), which obtained the prize of the Academy of Inscriptions; *Le mythe d'Œdipe* (1864); a valuable translation of Bopp's *Vergleichende Grammatik*, with learned historical and critical introductions (5 vols., 1867-74); with A. Bailly, a *Dictionnaire étymologique latin* (1885), and several works on French educational questions.

BREAM (ME. *breem*, OF. *bresme*, OHG. *brahsima, brahsina*, bream). A name applied to a variety of fishes belonging to different families. The common English bream, or carp bream (*Abramis brama*), is a member of the Cyprinidæ family, and an inhabitant of many rivers and lakes of Europe, even as far north as Norway and Sweden, and of some of those of England and Ireland. It thrives best in still water, and many grow to a weight of 6 to 12 pounds. The white bream (*Abramis blicca*) differs from the common bream in its silvery color, in its smaller size, and in several structural details. It also occurs on the Continent and in England. These fishes are favorite objects for quiet angling in England, and the carp bream was descanted upon at a great length by Izaak Walton. In America a minnow, the golden shiner (*A. chrysoleucus*), and a sunfish, the pumpkin-seed (*Eupomotis gibbosus*), are commonly called 'breams' in the Eastern States. (See MINNOWS and SUNFISH.) Several species of porgies (*Sparidæ*) also receive the name. See Plates of CARPS AND ALLIES; and of DARTERS AND SUNFISHES.

BREAST (AS. *breōst*, Goth. *brusts*, Ger. *Brust*, so called from its swelling protuberances; cf. AS. *berstan*, Eng. *burst*). One of the two protuberant glands situated on a woman's chest. A breast consists of a series of tubes, radiating from a common centre, the nipple, which is situated in an areola, a pink or dark-colored, nearly circular, area. On the surface of the latter are from four to ten sebaceous glands, which secrete an unctuous fluid to protect the skin of the nipple, which is very thin, from the saliva of the sucking infant. The *milk-tubes* (fifteen or eighteen in number) enlarge into *sinuses* and pass each to a separate lobe or subdivision of the breast, where they divide into twigs and branches (the *lactiferous ducts*), which end in minute vesicles. The lobes are held together by fibrous tissue, and are well packed in fat, which increases sometimes to an enormous extent the apparent size of the organ. It will be readily understood how over-distention of these delicate tubes, from whatever cause, must be productive of great suffering. When an abscess forms in the breast it is very dan-

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gerous to allow the pus to remain; but when an opening is made into the abscess the incision must radiate from the nipple, so as to avoid division of the milk-tubes. Besides inflammatory affections, the female breast is also subject to tumors. See TUMORS.

BREASTPLATE. In ancient armor, a plate of iron, steel, or other metal worn to protect the breast. At the end of the Twelfth Century the breastplate made its appearance in mediæval armor, as a thin plate of iron worn under the gambeson (q.v.). The custom of wearing it above the other defensive armor began in the Thirteenth Century, and was developed in the Fourteenth. The backplate, in like manner, was worn as a protection for the back. In modern armies the breastplate is represented by the front half of the cuirass worn by the cuirassiers in Continental armies and by the Life-Guards and Horse-Guards in England.

BREASTSUMMER, or **BRESSUMER.** A beam or 'summer' (q.v.) supporting the whole front of a building, in the same way in which a lintel supports the portion over an opening. They are seen in England and on the Continent of Europe, in old houses built partly of wood and partly of stone, brick, or mud.

BREAST-WHEEL. See WATER-WHEEL.

BREASTWORK. See FORTIFICATIONS, and HASTY INTRENCHMENTS.

BREATH (AS. *brœth*, odor, smell, exhalation, OHG. *brādam*, Ger. *brodem*, vapor, steam, exhalation), OFFENSIVE. The foul odor of breath may be due to a variety of causes, the most important being as follows: (1) *Digestive disturbance with constipation.* A purge should be used, repeating till the tongue is clean. Indigestible food, as well as beer and distilled liquors, should be avoided, especially if gas be produced in the stomach. (2) *Carious teeth*, and (3) *Food fermenting in the mouth.* All cavities should be filled. Food should be picked from between the teeth carefully after each meal and the mouth thoroughly rinsed. The teeth should be brushed morning and evening. (4) *Catarrh of nose.* In this case a warm nasal douche should be used three times a day, one-half ounce of liquid being employed each time, and the liquid being gently introduced into each nostril. Excellent results are obtained by thus using a mixture of part of Labarraque's solution and twenty parts of warm water. (5) *Catarrh of throat.* Gargle with hot water, and then apply with camel's-hair brush a coating of glycerite of tannin once a day to the back wall of the throat and the tonsils and the pillars of the fauces. Should these measures of relief of the nose and throat fail, a physician must be consulted. Dead bone or dead cartilage in the nasal cavity causes a most offensive odor, and removal is the only treatment. Abscess in the socket of a tooth or in the soft tissues of the mouth must be relieved by a dentist or a surgeon.

BREATHING. See RESPIRATION.

BREBEUF, brā'bēf', JEAN DE (1593-1649). A Jesuit missionary. He was born at Bayeux, northern France, March 25, 1593, and was killed in the Huron country, March 16, 1649. He came to America with Champlain in 1626, and his labors were mainly among the Hurons, with whose life and language he was very familiar. When the town of Saint Louis was taken by the Iroquois, Brebeuf and Lalemont, his associate, were made prisoners and tortured to death. It is said that Brebeuf's skull is preserved in the pediment of a silver bust in the convent of the hospital nuns in Montreal. Some of his writings on the Huron language are preserved, and were translated by Albert Gallatin and published in the *Memoirs of the American Antiquarian Society*, and some of his letters by Carayon (Paris, 1870). See his account in the *Jesuits' Relations*, ed. Thwaites, Cleveland, O.

BRECCIA, brĕ'chā (It., fragments of stone; cf. Fr. *brèche*, Eng. *breach* and *break*). In petrography, a mass composed of angular fragments of rocks cemented by mineral material. A breccia may be formed in a number of ways: (1) In the same way as a conglomerate (q.v.), except that the fragments are not rounded by water; (2) by the breaking of a rock into angular fragments by dynamic action, with subsequent cementation; (3) angular blocks may be thrown from volcanoes, which, after falling, become consolidated; (4) the surface of a lava flow may harden, break into angular fragments, and be ingulfed in the soft magma beneath, which on cooling yields a breccia; (5) in the intrusion of igneous rocks (q.v.), angular fragments broken from the walls may be caught in the molten mass of the intruded material; (6) some breccias have been formed by cementation of the loose angular fragments of talus slopes or screes. See DENUDATION; TALUS.

BRÈCHE DE ROLAND, brĕsh de rô'lăn' (Fr. Roland's Breach). A defile in the Pyrenees forming a passage between France and Spain, at the Cirque de Gavarnie, a few miles west of Mont Perdu. According to the legend, Roland made the cleft in the rock with his sword Durandal in the fight at Roncesvalles. The pass is about 200 feet wide and has an elevation of 9000 feet.

BRECHIN, brĕk"n. A town of Forfarshire, Scotland, on the South Esk, eight miles west of its junction with the sea at Montrose (Map: Scotland, F 3). Its chief architectural feature is a massive round tower of a character frequently met with in Ireland, but quite uncommon in Scotland. The town is well lighted and has an excellent water-supply. The chief industries are spinning, bleaching, and the manufacture of linens and sailcloth. Population, parliamentary and municipal burgh, in 1901, 8941. Brechin was once a walled town. David I. founded a cathedral and bishopric here in the Twelfth Century. The town was burned by Montrose in 1645. Consult *Registrum Episcopatus Brechiensis* (2 vols., Aberdeen, 1856).

BRECK, JAMES LLOYD (1818-76). An American clergyman and educator. He was born in Philadelphia, graduated at the University of Pennsylvania in 1838, at the General Theological Seminary in 1841, and in the latter year joined a mission for work among the Indians in Wisconsin. Later he established the Protestant Episcopal Church schools at Faribault, Minn., and was engaged in organizing similar schools at Benicia, Cal., when he died.

BRECK, SAMUEL (1834—). An American soldier, born at Middleborough, Mass. He graduated in 1855 at the United States Military Academy, served as lieutenant of artillery in the Seminole War, and from 1860 to 1861 was as-

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sistant professor of geography, history, and ethics at the Military Academy. During the Civil War he was assistant adjutant-general successively of General McDowell's division, the First Army Corps, and the Department of the Rappahannock, and assistant in the Adjutant-General's office at Washington. Brevetted brigadier-general, U.S.A., for meritorious services, he continued in the Adjutant-General's department until retired in 1898, and attained the rank of brigadier-general and adjutant-general.

BRECK'ENRIDGE. A village and county-seat of Wilkin County, Minn., 215 miles west by north of Saint Paul, on the Red River of the North, and on the Northern Pacific and the Great Northern railroads (Map: Minnesota, B 4). It is in a fertile agricultural region, and has grain-elevators, flour-mills, etc. Population, in 1890, 655; in 1900, 1282.

BRECKENRIDGE, Hugh Henry (1870—). An American artist, born at Leesburg, Va. He was a pupil at the Pennsylvania Academy of Fine Arts, won the scholarship for study abroad (1892), and studied in Paris under Bouguereau, Doucet, and Ferrier. In 1894 he became instructor at the Pennsylvania Academy of Fine Arts, and he received honorable mention at the Paris Exposition of 1900.

BRECKENRIDGE, John (1797-1841). An American clergyman, born in Cabell's Dale, Ky. He graduated at Princeton College 1818 and studied at the Theological Seminary, and in 1822 was licensed by the Presbyterian Church to preach. He was chaplain of the Federal House of Representatives from 1819 to 1821. His first church was in Lexington, Ky. (1823-26), where he established a newspaper, the *Western Luminary*. He also had a charge in Baltimore from 1826 to 1831, when he removed to Philadelphia and for several years was secretary and general agent of the Presbyterian Board of Education. In 1836 he became professor of theology in Princeton Theological Seminary, and two years later he was made secretary and general agent of the Board of Foreign Missions. He resigned in 1840, and just before his death was chosen president of Oglethorpe University, in Georgia. He published, under the title *Roman Catholic Controversy* (1836), his famous debate with the Rev. John Hughes, afterwards Archbishop of New York.

BRECKENRIDGE, John Cabell (1821-75). An American lawyer, soldier, and politician, born near Lexington, Ky. He was educated at Centre College and at Transylvania University, and practiced law at Lexington. He served as major in the Mexican War; sat in the State Legislature; and was a member of Congress from 1851 to 1855. In 1856 he was elected Vice-President of the United States on the ticket with James Buchanan. In 1860 he was nominated for President by the extreme Southern section of the Democratic Party, but, with Douglas and Bell, was defeated by Lincoln, receiving 72 electoral votes. He was immediately chosen United States Senator, but resigned to join the Secessionists, and entered the Confederate Army. He was made a major-general in 1861, served throughout the war, and took a prominent part in the battles of Shiloh, Murfreesboro, Chickamauga, Chattanooga, and Cold Harbor. He was Early's second in command in the Shenandoah campaign in 1864. From January to April, 1865, he was Secretary of War in the Cabinet of Jefferson Davis. At the close of the conflict he escaped to Europe, where he remained until 1868, after which he devoted himself to the practice of law.

BRECKINRIDGE, Joseph Cabell (1842—). An American soldier, born in Baltimore, Md. He studied at Centre College (Ky.), and the University of Virginia, entered General Nelson's army of Kentuckians, and subsequently was assigned to the Second Artillery, U.S.A. He served in the Shiloh, Gulf, and Atlanta campaigns, and was brevetted major for meritorious conduct before Atlanta. He was a member of the staffs of Generals Thomas, McDowell, and Halleck. In 1881 he became inspector-general, U. S. A., and in 1890 was appointed brigadier-general. During the Spanish-American War he served as major-general of volunteers in the Santiago campaign, and had his horse shot under him at San Juan, July 2, 1898. He afterwards commanded an army of 40,000 at Chickamauga, Ga.

BRECKENRIDGE, Robert Jefferson (1800-71). An American clergyman, brother of Rev. John Breckenridge (q.v.). He was born in Kentucky, graduated at Union College in 1819, practiced law in his native State, and was a member of the Legislature. In 1829 he joined the Presbyterian Church, and in 1832 obtained a charge in Baltimore, where he remained for thirteen years. In 1845 he became president of Jefferson College, and two years later removed to Kentucky and became State superintendent of public instruction. In 1853 he became professor of theology in Danville Seminary. He was a strong old-school leader in the great division of the Presbyterian Church. In the slavery discussion he was extreme on neither side, and when the Civil War began he was for the Union, though he was much opposed to the Emancipation Proclamation (q.v.). In 1864 he was president of the Republican convention which nominated Lincoln for a second term. Dr. Breckenridge is credited with having been the principal author of the common school system of Kentucky. His principal work is *The Knowledge of God, Objectively and Subjectively Considered* (2 vols., 1857-59).

BRECK'NOCKSHIRE, or **BREC'ON.** An inland county of South Wales, to the south of Radnor, from which it is separated by the Wye. Its length is about 35 miles, its average breadth 20 miles, and its area 734 square miles, of which two-thirds are cultivated (Map: Wales, C 5). Coal, iron, and lead are mined, and there are important iron manufactures; but agriculture provides the chief industries. The chief towns are Brecon, the county town and the only corporate one, Builth, Crickhowell, Hay, and Llanelly. Population (half of whom speak Welsh), in 1891, 57,000; in 1901, 59,900.

BREC'ON, or **BRECK'NOCK** (from *Brychan*, a native prince of the Fifth Century), or Aberhonddhu. The capital of Brecknockshire, South Wales, situated in an open valley in the middle of the county, at the confluence of the Usk and Honddhu, 171 miles west-northwest of London (Map: Wales, C 5). It lies in the midst of fine mountain scenery, and has beautiful public walks. The Church of Saint John is an excellent example of early English architecture. Ely Tower, the only remaining fragment of the old castle, is famous as the scene of the conference

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between the Bishop of Ely and the Duke of Buckingham, which resulted in the overthrow of Richard III. The town owns its water-supply, markets, and slaughter-houses. It has manufactures of flannel and coarse cloth, but its principal trade is in lime. Population, in 1891, 5794; in 1901, 5875. South of Brecon lie the twin mountain peaks, the Brecon Beacons. The town was founded soon after the Conquest. It was the birthplace of the famous actress Mrs. Siddons.

BREDA, brā-dä′ (Dutch *brede*, a plain, from *breed*, AS. *brād*, Ger. *breit*, Eng. *broad*). A town in the Province of North Brabant, Holland, situated at the confluence of the Merk and the Aa (Map: Holland, C 3). It is an old castle, dating from 1350, which was for a time the residence of Charles II. of England, but is now used as a military academy. Among the numerous churches, the most prominent is the Gothic cathedral dating from the Fifteenth Century, and containing the magnificent tombs of Count Engelbert II. of Nassau and his wife. The fortifications of the town, now dismantled, were once very formidable and provided with facilities for inundating the surrounding country in case of war. Breda has manufactures of carpets, cloth, and cigars, and its commerce is facilitated by a good harbor. Breda has had a very stormy career and has been the scene of a number of historical events. It was besieged and taken repeatedly by the Spanish and the French, and it was at Breda that the protest of the Dutch nobles against Spain, known as the 'Compromise of Breda,' was presented in 1566. It was also from Breda that Charles II. issued his 'declaration' before his restoration in 1660. Population, in 1899, 26,097.

BREDA, DECLARATION OF. See CHARLES II.

BREDAHL, brā-däl′, CHRISTIAN HVIID (1784-1860). A Danish poet. He was born at Hellestrup and was a fellow-pupil of Ingemann at the gymnasium of Slagelse. His first poetic work, *Dramatiske Scener* (1819), was followed by five volumes bearing a similar title and published successively from 1819 to 1835. In these dramas, as in his later works, he reveals an intense love of natural conditions and a thorough dislike of excess of culture. Bredahl is closely identified with the philosophical spirit of the Eighteenth Century as exemplified by Rousseau; and in his masterpiece he inveighs against tyranny and avarice, the arrogance of the nobility, and the domination of the priesthood. A new edition of his *Dramatiske Scener* was published in 1855 at Copenhagen.

BREDEN, brā′den, CHRISTINE (1844—). An Austrian poet known under the pseudonym of Ada Christen, born in Vienna. She was at first an imitator of Heine, but developed considerable originality in her later works. Her publications include *Lieder einer Verlorenen*, poems (1868, third ed. 1873); *Schatten*, poems (1873); *Faustina*, a drama (1871); *Ella*, a novel (1873); *Unsere Nachbarn; Jungfer Mutter, eine Wiener Vorstadtgeschichte* (1892). She was married in 1873 to Adalmar Breden, but retained her pseudonym, Ada Christen.

BREDEROO, brā-dā′rō, GERBRAND ADRIAENSZOON (1585-1618). A Dutch playwright and poet, born in Amsterdam. He was educated as a painter, but turned to literature, and took rank among the foremost Dutch writers of comedy. His most important plays are: *Het Moortje* (1615); *De Stomme Ridder* (1618); and *De Spaansche Brabander* (1618). The last named is considered his best work. He wrote also some harmonious and thoughtful poems, collected in 1622 (Amsterdam). His *Works* were first published in Amsterdam in 1638; the last edition was that of 1885-88 (ib., 3 vols.). Consult the study by ten Brink, *Gerbrand Adriaenszoon Brederoo* (Utrecht, 1859).

BREDERODE, brā′de-rō′de, HENDRIK, Count van 1531-68). One of the sovereign Counts of Holland, and a leader against Spanish domination in that country. He was one of the leaders of the League of the Gueux, and is said to have drawn up the 'Compromise' of 1566. After the complete success of the Spaniards, he asked Egmont to intercede for him with the regent. His followers, however, were dispersed, some were put to death, and he himself died a few months later in Germany, whither he had fled.

BREDOW, brā′dō, ADALBERT VON (1814-90). A German soldier, born in Berlin. As commander of the Second Cavalry Brigade of Prussia, during the War of 1866, he rendered distinguished services at the battles of Trautenau and Sadowa. Upon the outbreak of the Franco-Prussian War he was assigned to the command of the Fifth Cavalry Division, in which capacity he performed, with barely six squadrons, the most brilliant cavalry charge of the war—the desperate assault at Mars-la-Tour, by means of which a large division of the French Army was rendered powerless to assume the offensive. The gallant feat of this officer, who became lieutenant-general in 1871, has been perpetuated in song and story.

BREDOW, GABRIEL GOTTFRIED (1773-1814). A German historical writer, born in Berlin. He studied at Halle, in particular classical subjects under F. A. Wolf; succeeded J. H. Voss as rector of the school at Eutin (Lübeck) in 1802, and in 1804 became professor of history in the University of Helmstedt. In 1809 he was appointed professor in the University of Frankfort-on-the-Oder, with which he continued to be connected after its removal to Breslau, in 1811. His publications include a *Handbuch der alten Geschichte, Geographie und Chronologie* (1803, 6th ed. 1837); *Untersuchungen über einzelne Gegenstände der alten Geschichte, Geographie und Chronologie* (1800-02); and two volumes of a *Chronik des neunzehnten Jahrhunderts* (Vol. I., 1804; Vol. II., 1805; continued by Venturini), highly esteemed by Germans of the time because of its bold expressions regarding French domination. His *Weltgeschichte in Tabellen* (1801; 9th ed. 1851) was translated (with additions) into English by J. Bell (London, one vol. folio, 1820; from the 4th German edition).

BRÉE, brā, MATTHEUS IGNAZIUS VAN (1773-1839). A Flemish historical painter. He was born in Antwerp, and was educated partly there, and partly under Vincent, in Paris. As early as 1798, he attracted attention by his "Death of Cato," which was followed by several other excellent pictures. A peculiar talent for rapid and vivid sketching enabled him to execute for Napoleon, in a few hours, "The Manœuvring of the Fleet Before Antwerp on the Scheldt," and, with equal celerity, "Napoleon's Entrance into Amsterdam, at the Moment when the Magistrate Presents Him with the Keys to the City." In

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1816, he painted the famous Leyden burgomaster, Van der Werff, in the act of addressing the famished populace during the siege of 1576: "Take My Body, and Share It Among You." This work is marked by a felicitous arrangement of the figures, and by a bold and lively coloring, after the style of Rubens. In the latter part of his life he was director of the Academy of Fine Arts in Antwerp.

BREECH (*breech*, the hinder part of the body; AS. *brēc*, breeches, plur. of *brōc*, Dutch *broek*, a pair of breeches; cf. Lat. *bracæ*, trousers, breeches). The rear part of a gun or other object. The heavy piece of metal which closes the breech of a gun and receives the pressure of the powder-gas is known as the *breech-block* or *breech-plug*. When a gun is charged through the breech it is known as a breech-loader. The breech and its adjuncts are important parts of guns and small arms, and will be found described and illustrated in the articles GUNS, NAVAL; ORDNANCE; and SMALL ARMS.

BREECHES BIBLE. See BIBLE, CURIOUS EDITIONS OF.

BREECHES BUOY. See LIFE-SAVING SERVICE.

BREECH-LOADING ARMS. See SMALL ARMS; ARTILLERY; COAST ARTILLERY; FIELD ARTILLERY; GUNS, NAVAL; and ORDNANCE.

BREEDE, brā'de (Dutch, 'the Broad'). A river of Cape Colony. It rises about 75 miles northeast of Cape Town, flows south, and empties into Saint Sebastian Bay (Map: Cape Colony, E 9). It is navigable for 40 miles.

BREEDS AND BREEDING (AS. *brēdan*, to nourish, keep warm, from *brōd*, brood). A breed, in domestic animals, is a race, variety, or strain resembling the general type of the species, distinguished by particular characters or qualities which are transmitted and maintained. Breeds owe their origin to the tendency of animals toward variation, and to natural and artificial selection. Under domestication, the same kind of species of animals has changed naturally to a different extent and in a different direction as a result of environment. Certain variations have been found better adapted to specific purposes, and these variations have been perpetuated by man by restricting the coupling, i.e. by selection and breeding. This process, carried on consistently through successive generations, has produced a group of animals of sufficiently marked characteristics, which are capable of being transmitted to the offspring, and which entitle these animals to be recognized as distinct breeds.

Plants, like animals, tend toward variation, and, as a result of this, the equivalent of different breeds, usually spoken of as varieties or strains, have been produced. The principles underlying the breeding of plants and of animals are not the same in all respects, and the methods of operation are not entirely analogous; hence the subjects of plant breeding and animal breeding can best be considered separately.

PLANT BREEDING. The variation in plants may be due to natural causes, as environment, etc., or it may be the result of design on the part of man, in which case it is secured by artificially crossing two or more races or varieties. The natural tendency to be unlike shows itself in 'sports' of various kinds. Artificial variation is secured by fertilizing the ovules of one plant with pollen from another, the progeny of such a union often exhibiting widely differing characteristics. Plant breeding is the fixing, by selection, of the desirable traits found in the variations, whether naturally or artificially produced. The farmer or gardener who seeks to improve his crop by planting seed from the most favored individuals is practicing plant breeding. This kind of plant breeding has been going on in all countries ever since the cultivation of plants was begun. The improvement of plants by selection from artificially produced variations is of more recent origin. The production of varieties by crossing has its basis in the sexuality of plants, a discovery of Camerarius in the last decade of the Seventeenth Century. Crossing is the fertilizing of a flower of one variety with the pollen of a flower of another variety of the same species. Hybridizing is the same operation, but between two species of the same genus. The first artificial hybrid is said to have been produced by an English gardener, Thomas Fairchild, in 1719, when he crossed the Carnation with the Sweet William. The practical application of hybridization to plant breeding did not take place until the early part of the Nineteenth Century, when the investigations of Knight, an Englishman, and Van Mons, a Belgian, were made. In the United States, the earliest investigators along this line were Joseph Cooper and James Thatcher. Since these pioneers, many persons have devoted their energies to the improvement of races of cultivated plants. Conspicuous among these have been Hallet, of England; Rimpau, of Germany; Vilmorin, of France; and Hays, of the United States, all of whom have developed new and improved varieties of cereals; Louis de Vilmorin and his son, Henri de Vilmorin, of France; Rabbethge and Giesecke, of Germany, who have developed the sugar-beet; Richter, Girard, and Burbank, who have worked with potatoes; Livingston with tomatoes; Clark and Hinson with Sea Island cotton; Hovey and Dana with pears; Bull, who originated the Concord grape in 1840; Allen, Munson, Millardet, and many others, with grapes; Burbank with plums and berries. Many others have worked with all sorts of fruits and ornamentals.

In any system of plant breeding, selection plays a most important part. Some natural variants or sports are propagated by cuttings or grafts, which is the most simple method of plant breeding. Others are grown from seed, like artificial crosses, and plants from these tend to wide variation. This tendency can be overcome only by continual rejection of all plants that depart from the desired type, seed being saved only from those which most nearly conform to the ideal type. By continuing this process through a number of years or crops, a race will be found that will closely resemble the type in all its individuals. The amount of care and labor involved may be seen from the statement that a breeder of sugar-beets examined, in one season, more than 3,000,000 roots of an improved variety, only about 3000 of which were accepted for further trial.

When selection is practiced for producing new races or varieties of cultivated plants, there are a few axiomatic principles to be observed: Always continue selection upon the same lines, once it is begun. Great size and numerous parts cannot usually be secured in the same variety, nor are extraordinary earliness and great productivity found associated together.

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The following are important contributions to the subject of Plant Breeding: United States Department of Agriculture *Year-books for 1897, 1898 and 1899; Experiment Station Record*, Vol. VII. (Washington, 1896) and Vol. XI. (Washington, 1899); Carrière, *Production et fixation des variétés dans les végétaux* (Paris, 1865).

ANIMAL BREEDING. The art of breeding animals, as practiced at the present day, is founded on the practice of the most successful breeders, and its rules are almost exclusively empirical in their origin. They have not been worked out on the basis of scientific investigation and experiment, but may be regarded rather as contributions to science than deductions from it. Hence, while many interesting and instructive experiences and observations have been recorded, and these have been brought together and discussed in the light of the best knowledge available, comparatively few general principles have been deduced as yet, and many important points upon which it would be exceedingly valuable to have definite information remain in obscurity. The breeding of animals has not yet been placed upon the scientific basis that, thanks to systematic investigation, many other lines of agricultural practice now occupy.

Breeding has been practiced from the earliest times, the horse having apparently received more attention from the ancients than the other kinds of farm animals. The ancients evidently had some knowledge of the laws of heredity, although much stress appears to have been laid upon the exercise of external influences as well. Up to the middle of the Eighteenth Century the theory that "like produces like," and the rule to "breed from the best," comprised what was known of the principles of breeding, but it is evident that the extended applications of these empirical expressions were not fully appreciated. The early breeders had no consistent system of selection—their standards of excellence were, in fact, constantly changing, so that the conception of the 'best' differed widely from time to time, and this prevented any very high development of the most valuable qualities. Soon after the middle of the Eighteenth Century, Robert Bakewell, of England, originated a new system of breeding, based upon careful selection from a single variety or breed, and close breeding to develop certain desirable qualities. The crossing of different breeds had previously been held to be the road to improvement. He believed that the maxim, "like begets like," was not limited to the external or more obvious characteristics, but extended to the minutest detail of the animal organism. He regarded the animals he worked with as plastic, and he sought so to mold these plastic forms as "to give expression to his ideal conception of the qualities that constitute perfection." His work and teachings produced a very marked effect on the practice of breeding, and the following out of his theories by a long line of able breeders has given us many improved breeds of live stock, each adapted to special conditions and purposes.

Our knowledge of the principles of breeding rests to-day upon the development and the more intelligent application of the old maxim that like produces like—i.e. upon the law of heredity. According to this law, every animal embodies the sum of the characters inherited from its parents and ancestors, and those acquired as a result of its environment. The animal "inherits an assemblage of peculiarities representing the aggregate of parental characters," thus presenting a composite of its ancestors, which has been likened to a composite photograph of a number of persons, containing traces of each individual, some hardly discernible, but strongest along certain lines common to all. Miles has advanced the theory that while all the characters are directly transmitted, some may become dominant in the offspring, and thus determine its external form and general characteristics, while others remain latent until the conditions finally become favorable to their development in an offspring, when they in turn may become dominant, and thus obscure other characters. This theory has some degree of plausibility, and would account for many apparent exceptions to the law of heredity. Those who do not accept it entirely hold that only such characters as have become fixed are transmitted with certainty, and that the theoretical effect of the law of heredity is only realized or approximated in proportion as the ancestry has acquired a fixed and unvarying type.

At all events, heredity may be depended upon to govern the general characteristics which determine the species, and the less general ones which distinguish the breed. Beyond this it is the object of the breeder to maintain the standard of excellence which has been attained, and to intensify certain desirable qualities as they appear and make them fixed characteristics of the breed or family. The highly artificial characters which render the animals of a breed valuable for a specific purpose are, from their very nature, more difficult to retain than are the less divergent characters of the original type. They can only be secured in their greatest perfection by persistent effort in the systematic accumulation of slight variations in the desired direction, and they can only be made the dominant characters of a family or breed by breeding exclusively from animals in which they are the most conspicuous. As soon as the breeder relaxes his efforts—i.e. neglects the selection of the breeding stock—degeneration will inevitably set in, and it will not long be prevented by any supposed constancy of the breed.

One annoying factor which the breeder often meets with, and which sometimes sets his calculations at naught, is atavism, or reversion, as Darwin has called it. This is the appearance in an offspring of peculiarities of a more or less remote ancestor, as form, color, or traits, which have not been observed in the parents. It is a form of heredity, and has long been known to breeders under a variety of names, as 'throwing back,' 'crying back,' etc. If the qualities which crop out in this way are sufficiently pronounced or undesirable, the value of the animal may be materially decreased; but practically atavism is not often a matter of great importance in breeding animals which have been bred for a long time, as it usually manifests itself in small and unessential details. It is referred to by Miles as an evidence that no limit can be set to the inheritance of characters, and that theoretically a defect or peculiarity cannot be entirely 'bred out,' although it may be removed so far as to scarcely merit attention.

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In practice the offspring nearly always shows a closer resemblance to one parent than to the other. This is attributed by stock-breeders to prepotency, which may be defined as the superior influence of one parent over the other in determining the characteristics of the offspring. Like atavism, prepotency is a well-established phenomenon, recognized by all breeders, but about which little is known or can be prophesied in a particular case. It is an important factor, especially in the case of the male, as he is selected for special desirable qualities which he is expected to impress upon his numerous progeny.

Reference was made above to the part played by variation in the evolution of breeds. It is also the factor which is responsible for the degeneration of improved breeds when left to themselves. It may be defined as the tendency which domestic animals exhibit under certain conditions to differ or depart from the parental type, contrary to the law of heredity. The principal causes of animal variation are climate, food, habits, and environment in general. It may be in the direction of improvement, in which case it can be taken advantage of by the breeder, or it may be in the opposite direction. Such variations are usually prepotent over the normal characteristics, and are usually complex rather than simple, affecting more than one organ. This is in agreement with the law of correlation, according to which any peculiarity in the development of one organ or set of organs is usually accompanied by a corresponding modification or suppression of organs belonging to another part of the system. On account of this tendency to variation, it is only by the closest watchfulness that the excellence of many of the higher developed breeds of animals can be maintained.

Success in breeding depends primarily on skill in selecting and managing the breeding stock. The animals selected should be as nearly perfect as possible in conformation and build, have the valuable qualities which it is desired to perpetuate developed in the highest possible degree, and be capable of transmitting these qualities to the offspring. Special attention should be given to selecting the male, not because of any special known influence of sex, aside from prepotency, but because he impresses his characters upon a much larger number of progeny than does the female. A further reason for this is the supposed influence which previous impregnations, and especially the first, may exert upon the female. The hypothesis is that the influence of the male is not limited to his immediate offspring, but may extend through the female that he has impregnated to the offspring which she produces subsequently by coupling with another male. This influence is designated technically as telegony. A large number of instances of such an apparent influence are on record, and it is quite widely believed in by English breeders. The leading authorities in Germany have not accepted it, and those who have admitted the possibility of it consider that it has not been proved. Some interesting experiments with horses and zebras, recently reported by Prof. J. C. Ewart, of Edinburgh, seem to support the belief in telegony, but for the present it must be regarded as open to some doubt.

Selection and the coupling of animals is the practical application of the principles of breeding as briefly enumerated, and its successful accomplishment requires the ability to conceive or comprehend an ideal and to maintain or develop it. In the coupling of animals several systems or practices are recognized, depending upon the relationship of the sire and the dam, as in-and-in breeding, line breeding, cross-breeding, etc. In-and-in breeding, or close breeding, is the coupling of animals nearly related. Regarding the closeness of relationship implied in these terms, it not only appears that no definite rule has been established, but also that different writers use them with a somewhat different shade of meaning. This probably accounts largely for the difference of opinion of writers regarding the merits of the practice. In theory it rests upon the belief (1) that to produce the best animals the best obtainable stock should be selected and bred together, and this repeated with the offspring over and over again, thus maintaining the excellences of the family free from the intermixture of any less excellent blood, and fixing the desirable characters; and (2) that the in-and-in bred animals are prepotent over others. The object sought is to establish desired forms or qualities with the greatest certainty and in the least time. Those who object to close breeding hold that it carries with it danger of loss of constitutional vigor and fertility in the offspring, loss of size, and sometimes malformation. This danger undoubtedly depends upon the extent to which the practice is carried and upon the character of the animal. The more purely bred and uniform in type the stock becomes, the greater does the probable danger become; while with miscellaneously bred stock the evil effects are comparatively slow in showing themselves. All the great breeders have practiced close breeding to a greater or less extent, apparently for the purpose of retaining and fixing certain desirable characteristics that have been developed by modified conditions. They evidently intended to breed together animals of the same qualities, regardless of relationship. The practice is generally conceded to be an important means of improvement, when judiciously followed.

Closely allied to in-and-in breeding is line breeding, which, as applied to a distinct system, is comparatively new. Historically it is an offshoot of in-and-in breeding. It consists in breeding within a few closely related stocks or families, no animals being interbred which are not closely connected in the general lines of their blood. The practice tends to bring about uniformity in a herd, reducing the animals to a single type; but it is claimed that carried too far, it leads to retrogression rather than improvement, as every fault and defect becomes fixed, and deterioration in size and vigor are liable to result.

Natural or miscellaneous breeding is held by conservative writers to be the safest course in the long run. In this the breeder does not confine himself to any family or strain of blood, but selects the best individual animals obtainable, the sole object being to secure the best possible offspring. It avoids any danger there may be in close breeding, and the infusion of fresh foreign blood is held to increase the vigor of the

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offspring. This system of breeding frequently implies the crossing of representatives of different families of the same breed, and hence is sometimes referred to as 'making a cross,' 'cross-breeding,' etc. Strictly speaking, however, cross-breeding is the coupling of animals of distinct breeds. A cross between an animal of a recognized breed and a native or unimproved stock is spoken of as 'grading up,' and the product as a 'grade.' In the past cross-breeding has been practiced for deriving new breeds or the improvement of a breed in some particular. At present, it is most commonly used as an occasional remedy for some fault. There is a general belief that crossing usually results in increased size and vigor and greater fertility, although if cross-breeding is carried so far as to unite distinct species, fertility may be entirely lost. A familiar example of this is the crossing of the ass and the mare, resulting in the mule, which is a sterile hybrid.

The control of the sex of the offspring has been a matter of speculation ever since the days of Aristotle, and a long list of rules have been advanced which have found some measure of favor for a time. It still remains a matter of speculation, however, and in the present state of knowledge is entirely beyond the control of the breeder. The case appears to be similar with regard to the relative influence of the male and the female on the progeny. A variety of theories have been advanced and stoutly contended for—some to the effect that one parent controls the external appearance and the other the disposition, others that the outward form and organs of locomotion are chiefly determined by the male, while the vital organs, size, and vigor are determined by the female. But we have yet to discover how the natures of the parents are mingled, and apparently have made very little advance in accurate knowledge. For a more detailed discussion of the theories, principles, and practice of breeding animals, the reader is referred to Darwin, *Variations of Plants and Animals Under Domestication* (London, 1885); Miles, *Stock Breeding* (New York, 1878); and Warfield, *Theory and Practice of Cattle Breeding* (New York, 1889). The different breeds of live stock are considered under CATTLE; HORSE; SWINE; SHEEP; POULTRY, etc. See, also, HEREDITY.

BREED'S HILL. The hill in Charlestown (Boston), Mass., on which the battle of Bunker Hill was fought, and which is the site of the Bunker Hill Monument. It is somewhat south of the true Bunker Hill.

BREESE, KIDDER RANDOLPH (1831-81). An American naval officer, born in Philadelphia. In 1846 he entered the navy as a midshipman. At the beginning of the Civil War he served as commander of the third division of Porter's mortar flotilla, in the attacks on New Orleans and Vicksburg (1862), and, as lieutenant-commander, participated in the important operations on the Mississippi and its tributaries, during 1863 and 1864. He was then appointed fleet-captain of the North Atlantic blockading squadron, in which capacity he commanded the storming party in the naval assault on Fort Fisher (q.v.), January 15, 1865. In 1874 he was raised to the rank of captain.

BREEZE. See WIND.

BREFELD, brā'fĕlt, OSKAR (1839—). A German botanist, born at Telgte, Westphalia. He was appointed professor of botany at Eberswalde (1878), Münster (1884), and Breslau (1898). His scientific investigations may be said to cover the field of mycology. It was he who introduced the so-called 'gelatin cultures' which at one time gained such wide application in bacteriology. He published a series of volumes entitled *Untersuchungen aus dem Gesamtgebiete der Mykologie* (1872).

BREGENZ, brā-gĕnts' (anciently, Lat. *Brigantium*, the town on the heights, from Celt. *braigh, brig*, heap, elevation). The capital of the Austrian Crownland of Vorarlberg, situated about 1285 feet above sea-level, on the eastern shore of Lake Constance (Bodensee), 6 miles southeast of Lindau by rail, and 121 miles west-northwest of Innsbruck (Map: Austria, E 1). It consists of the old, or upper, town and the new town, almost surrounding the former. Bregenz has a fine town hall and a museum containing a fine collection of Roman antiquities found in the neighborhood. Since the construction of the Arlberg Railroad (1880-84) and the introduction of steam navigation on the Lake of Constance, the importance of the town has largely increased. Its industries include the manufacture of cotton and silk fabrics and jewelry, and there is a considerable trade in grain, wood, and cattle. Population, in 1890, about 6700; in 1900, 7600. Under the name of Brigantium, the town was a Roman station, and in the Middle Ages the seat of the powerful Counts of Bregenz. In the Sixteenth Century it passed to the House of Hapsburg.

BRÉGUET, brā'gā', ABRAHAM LOUIS (1747-1823). A French mechanician and watchmaker, a native of Neuchâtel. The astronomical and nautical instruments invented by him were noted for the perfection of their workmanship. His improvements in watches included the use of rubies in pivot-holes. He was made a member of the Academy of Sciences in Paris, and of the French Bureau of Longitude. A grandson, LOUIS (1808-83), also a watchmaker, had charge of establishing the first telegraphic line in France. He also invented the system of electric clocks for transmitting time to a distance, and published a number of works on the telegraph. He was a member of the French Academy of Science.

BREHM, brām, ALFRED EDMUND (1829-84). A German naturalist and traveler. He was born in Reuthendorf, February 2, 1829, and died there November 11, 1884 He studied natural history and ornithology with his father, who was a celebrated ornithologist. From 1847 to 1854 he traveled through Egypt, Nubia, and the Sudan, and later in Spain, Lapland, Abyssinia, and Siberia. In 1862 he was appointed director of the Zoölogical Garden in Hamburg, and from 1867 to 1874 he was director of the Berlin Aquarium. He published in 1863 the first edition of the *Illustrirtes Thierleben*, the most important work of its kind at that time.

BREHM, CHRISTIAN LUDWIG (1787-1864). A German ornithologist. He was born in Schönau, near Gotha, studied theology in Jena from 1807 to 1809, and held several pastorates. His most valuable works are: *Beiträge zur Vogelkunde*, 3 vols. (1821-22); *Lehrbuch der Naturgeschichte*

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aller europäischen Vögel, 2 vols. (1823-24); *Ornis* (1824-27); *Handbuch für Liebhaber der Stuben-, Haus- und aller der Zähmung werten Vögel* (1832); *Der vollständige Vogelfang* (1855); *Die Eier der europäischen Vögel nach der Natur gemalt* (in collaboration with Baedeker and Paessler, 1855-67).

BRE'HON (Ir. *breathamh, breitheamh*, from O. Ir. *brithem*, judge, from *breth, brāth*, decision, judgment) **LAWS.** The ancient laws of Ireland. In the form in which they have come down to us, they consist of a collection of law tracts, which were compiled by different hands and at different times, and committed to writing probably in the Tenth Century of our era. They derive their name from the *Brehon*, a class of hereditary lawyers and judges, by whom they were preserved by oral tradition, and ultimately embodied in written form. These tracts—the most important of which are the *Senchus Mor*, or 'Great Book of the Ancient Law,' and the *Book of Aicill*—consist of brief and sometimes rude statements of the law, often expressed in verse, accompanied by elaborate annotations and commentaries made by successive *Brehon* through whose hands they passed. In this way the primitive body of law was modified from generation to generation to conform to the growth of the Irish people in Christianity and civilization. In its original form this law does not differ widely from that of other early systems, such as the Twelve Tables of Rome, the Mosaic Law, and the barbaric codes of the Middle Ages, most of its provisions having to do with crimes of violence, and the commutation of the penalty for such crimes by money or other payments. The poet Spenser, in his *View of the State of Ireland*, written in 1596, describes the Brehon law as "a rule of right unwritten, but delivered by tradition from one to another, in which oftentimes there appeareth great share of equity, in determining the right between party and party, but in many things repugning quite both to God's law and man's; as, for example, in the case of murder, the brehon—that is, their judge—will compound between the murderer and the friends of the party murdered, which prosecute the action, that the malefactor shall give unto them, or to the child or wife of him that is slain, a recompense, which they call an *eric;* by which vile law of theirs many murders amongst them are made up and smothered: and this judge being, as he is called, the lord's brehon, adjudgeth for the most part a better share unto his lord, that is, the lord of the soil, or head of the sept, and also, unto himself for his judgment, a greater portion than unto the plaintiffs or parties grieved." This characteristic English utterance might have been modified if Spenser had been aware of the fact that pecuniary compensation for manslaughter was a salutary device of primitive society for mitigating the horrors and inconveniences of private vengeance, and that it had prevailed in England as well as in all other European countries. (See BLOOD FEUD; BLOOD-MONEY.) As has been seen, he was mistaken, also, in believing that the Brehon laws were, at the period of his visit, an unwritten code, though they may still, in that backward state of society, have depended largely on tradition for their preservation. Many manuscript collections of these laws, dating from the Fourteenth to the Sixteenth century, still exist in public and private libraries in England, Ireland, and Belgium. The first translation into English was published in 1865-69. (See BRETTS AND SCOTTS.) Sir Henry Sumner Maine has considered the primitive Irish law at length and with great learning in his *Lectures on the Early History of Institutions* (London, 1875). Consult also Ginnell, *The Brehon Laws* (London, 1894).

BREISACH, brī-zäg' (anciently, Lat. *Mons Brisiacus*, possibly from Celt. *brig*, elevation, hill + Teut. *aha*, water), ALT. A very old town of the Grand Duchy of Baden, situated on an isolated basaltic hill, on the right bank of the Rhine, about 12 miles west of Freiburg (Map: Germany, B 4). It is a thriving little town with manufactures of wall-paper, beer-brewing, wine manufactures, etc., and a trade in lumber and cattle. As early as the time of Julius Cæsar, Mons Brisiacus was known as a strong military position, and was taken by Ariovistus when he invaded Gaul. During the Middle Ages it frequently changed masters, and, after having been for a time a free imperial city, became a possession of the House of Austria. Its military importance made it a battle-ground for the French and Austrians in the Seventeenth and Eighteenth centuries. The French destroyed its fortifications in 1744, and, during the War of the Revolution in 1793, burned the town. In 1805 the French handed it over to the House of Baden. Population, in 1890, about 3000; in 1900, 3500. Consult Coste, *Notice historique sur la ville de Vieux-Brisach* (Mulhouse, 1860).

BREISGAU, brīs'gou (Ger. *Breis*, for *Breisach-Gau*, district). A former district in the southwest corner of Germany which extended along the right bank of the Rhine and embraced Freiburg and the southern Black Forest. In the latter part of the Middle Ages, Austria became mistress of most of it. She was dispossessed in the Napoleonic wars, and since 1810 the whole of Breisgau has been a part of Baden.

BREITBACH, brīt'bäg, KARL (1833—). A German painter. He was born in Berlin, and was a pupil of the Academy of Art, in that city, and of Couture, in Paris. He settled in Berlin, where he devoted himself to landscape, genre, and portrait painting. The following are among his principal works: "Mill of Saint-Ouen, near Paris;" "Park of Trianon;" "Autumn Evening in the Weser Valley;" "Sunrise in the Bavarian Highlands;" "Kirmess-Joy;" "Kirmess-Woe;" "At the Fortune-Teller's;" "In the Village Tavern;" and portraits of Intendant General von Hülsen, the painter Theodore Weber, and others.

BREITENFELD, brī'ten-fĕlt (Ger. *breit*, broad + *Feld*, plain, field; referring to the plain near by). A village in Saxony, about five miles north of Leipzig, noted as the scene of two battles between the Swedes and the forces of the German Empire. On September 17 (new style), 1631, Gustavus Adolphus and the Elector of Saxony overthrew Tilly at Breitenfeld, shattered his army, and saved the cause of Protestantism, which had been imperiled by the fall of Magdeburg. Eleven years later, November 2, 1642, Torstenson, the pupil of Gustavus, signally defeated the Archduke Leopold and General Piccolomini on the same spot. Breitenfeld also had some of the fighting around Leipzig in October, 1813. Consult Opitz, *Die Schlacht bei Breitenfeld 1631* (Leipzig, 1892).

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BREITHAUPT, brīt'houpt, JOHANN AUGUST FRIEDRICH (1791-1873). A German mineralogist. He was born at Probstzella, Thuringia, and studied at the University of Jena, and at the Academy of Freiberg. Here he received an appointment in 1813 as teacher and lapidary, and in 1827 became professor. He wrote *Ueber die Echtheit der Krystalle* (1816) and *Vollständige Charakteristik des Mineralsystems* (1820; 3d improved ed., 1832). He also continued Hoffmann's *Handbuch der Mineralogie*, adding five chapters to this valuable work. Toward the close of his life he became almost totally blind. He increased the nomenclature of crystallography, and introduced the so-called *Progressionstheorie*, which seeks to derive every species of crystal from a few isometric forms. He also carefully examined almost all the minerals known in his day, and took 3000 measurements of calcareous spar alone. The opening of the great coal-fields at Zwickau, in Saxony, was due to his initiative. His other publications include *Die Paragenesis der Mineralien* (1849) and *Die Bergstadt Freiberg* (1825; 2d ed., 1847).

BREITKOPF, brīt'kōpf, JOHANN GOTTLOB IMMANUEL (1719-94). A German printer and proprietor of a well-known publishing house of Leipzig, established in 1664, and known as Breitkopf & Härtel since 1795. He was born in Leipzig, and graduated from the university of that city. His investigations in history and mathematics led him to a scientific study of printing, which resulted in a more artistic development of German text, and an improvement of musical notation (1754). At the time of Breitkopf, the old form of musical notation had been almost forgotten. Compositions were either written or engraved, and the form of printing music now principally used is undoubtedly due to his initiative. His writings include the following: *Ueber die Geschichte der Erfindung der Buchdruckerkunst* (Leipzig, 1779); *Ueber den Druck der geographischen Karten* (3 parts, Leipzig, 1777-79).

BREITMAN, brīt'mân, HANS. See LELAND, CHARLES GODFREY.

BREKELENKAM, brā'ke-lēn'kâm, QUIRYN (1620-68). A Dutch genre painter. He was born at Zwammerdam, near Leyden, and was probably a pupil of Gerard Dou. He depicted principally scenes from folk-life, market scenes, and domestic interiors. His works are characterized by simplicity and remarkably effective coloring. The following are a list of his principal paintings: "The Fireside" (1664, National Gallery, Amsterdam); "Monk Writing" (Louvre); "Consultation" (ibid.); "Interior" (1662, Museum of Lille); "The Sandwich" (Leyden Museum); "Saying Grace" (Cassel Gallery); "Game of Cards" (Brunswick Museum); "A Brazier" (Augsburg Gallery).

BREMEN, *Ger. pron.* brā'men (*Brema, Bremon* of the Eighth Century, possibly the *Phabiranum* of Ptolemy). A State and free city of Germany, on the Weser, about 50 miles from its mouth. Latitude 53° 5′ N., longitude 8° 48′ E. (Map: Germany, C 2). The State comprises an area of 99 square miles, the city, of only ten square miles. The latter, however, holds nearly three-fourths of the total population of the State. In addition to the city of Bremen the State of Bremen contains the cities of Vegesack and Bremerhaven. Bremen is divided into the old and the new town—the former on the right, the latter on the left side of the river, which is spanned by four bridges. The old town has crooked, narrow streets and a quaint appearance; it forms the business district of the city. The new town has broad, straight, well laid out streets lined with tall handsome buildings. The ramparts and bastions round the old town have been leveled, and the site converted into public promenades, which are laid out with excellent taste. Among the principal buildings, the cathedral (built about 1160), the Gothic town hall (begun about 1405), with its famous wine-cellar, said to contain hock of the vintage of 1624, the exchange museum, the post-office, and the observatory of Olbers, from which he discovered the planetoids Pallas and Vesta, are noteworthy.

The situation of Bremen makes it a great emporium of northwest Prussia. Besides its excellent water communication, it is connected by railways with the whole of western and central Germany. Large vessels stop at Bremerhaven, where there is a spacious harbor constructed about 38 miles below Bremen. Vessels not drawing more than seven feet of water can come up to the town itself. Altogether there are four harbors, including the 'Safety' or original harbor. Bremen carries on an extensive commerce with European countries, the United States of America, the West Indies, Africa, the East Indies, China, and Australia, and is the largest port in the Empire of Germany next to Hamburg. This commerce has shown a remarkable development since 1847, rising from 197,000,000 marks in that year, to 1,276,000,000 in 1891, and it has since increased, as is shown further on. The chief imports are tobacco, coffee, sugar, cotton, rice, skins, dye-woods, wines, timber, hemp, etc. Articles of food and raw materials constitute nearly 80 per cent. of all the imports, whereas manufactured articles make up less than 20 per cent. This partly explains why the United States has such a preponderance over the other countries in the matter of these imports. Of the 1,100,000,000 marks in value of imports brought into Bremen in 1900, the United States sent 37 per cent., which was more than the amount all the German States combined had sent, viz. 30 per cent. Great Britain's share was only 4.4 per cent., and that of the rest of Europe, 7 per cent. The growth of the total imports into Bremen and of those from Great Britain and from the United States may be seen from the following table:

AVERAGE ANNUAL VALUE IN MILLIONS OF MARKS

	1847-51	1857-61	1867-71	1877-81	1887-91
Total	106	222	353	493	657
Great Britain	7.6	26.6	52.6	58.6	41.8
United States	14	54	92	166.7	192

Thus while in 1850 the imports from the United States were less than twice those of Great Britain, they were four and a half times as large forty years later, and while the total imports during that period increased more than six times, those from the United States increased fourteen times.

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The growth of Bremen's own marine may be seen from the following figures:

Year	Vessels	Tonnage
1852	240	79,000
1862	277	134,000
1872	252	174,000
1882	344	299,000
1892	405	406,000
1899	526	513,000
1900	571	583,000

The exports of Bremen consist of woolen goods, linens, glass, rags, wool, hemp, hides, oil-cake, wooden toys, etc. Large quantities of tobacco are reëxported. With the exception of Hamburg, no Continental port ships so many emigrants to the United States as Bremen. Bremen has manufactures of woolens and cottons, cigars, paper, and starch, and extensive ship-building yards, breweries, distilleries, and sugar-refineries. It has steam communication with New York, Hull, Havana, the north coast of South America, etc., by vessels of the North German Lloyd Steamship Company.

There is only one government for both the city and State, viz. the municipal council composed of two houses, similar to that of Hamburg (see HAMBURG). The Senate is composed of 16 members, 10 of whom must be lawyers; the Lower House, the *Bürgerschaft*, of 150. The latter are elected by the citizens under an unequal suffrage. The administration is carried on by twelve departments, called ministries, each presided over by a Senator.

Bremen owns its gas-works, water-works, and electric plant, all of which are under the management of a single department, called the 'Deputation für Gas- und Wasserversorgung.' The municipal management of all of these undertakings has proved to be a great benefit to the citizens, besides yielding an increasing annual net income to the city treasury. The electric plant has been in operation since 1893 and has proved equally successful.

The street cars are in the hands of private companies, paying the city one-fourth of all their net income in excess of 5 per cent. on the capital stock, in addition to a tax of 1 per cent. on the gross income and all ordinary taxes levied upon business establishments. With the exception of one line, which employs horses, the city lines have been using electricity as a motive power since 1893.

The street-cleaning, the health department, and all that goes to make the city clean and healthful, are well administered, as may be seen from the following figures of death-rates in the city and country districts, per thousand: 1894 (city), 16.76; (country), 22.33; 1898 (city), 16.69; (country), 21.70.

The public schools are maintained and controlled by the city. In addition to the elementary schools, there are a high school, a commercial school, and a number of trade schools. Among the charitable institutions of the city there are three orphan asylums, two homes for neglected children, several hospitals, etc. It is interesting to note that Bremen spends nearly twice as much money on education as on police. The population of Bremen is increasing rapidly: in 1870, 81,000; in 1880, 113,000; in 1890, 125,000; in 1900, 163,000. The population of the State in 1900 was 224,700.

HISTORY.—Bremen, mentioned in 782 as a missionary centre, was made the seat of a bishopric by Charlemagne in 788. In 845 the see of Hamburg was united to that of Bremen, and the latter became the capital of the new archiepiscopal diocese. In 965 Bremen was made a market-town, and was placed under the jurisdiction of the archbishop; but by the Thirteenth Century it had succeeded in acquiring virtual independence in secular affairs. It prospered wonderfully; it extended its trade to England and Scandinavia, founded a number of colonies, and ruled over both banks of the Weser to the sea. It joined the Hanseatic League in 1276, but was expelled, readmitted, and expelled again, for selfishness. The inhabitants became fervent Protestants, joined the Smalkaldic League in 1532, and in 1547 decisively defeated an Imperial army at Drakenburg. In two wars (1654, 1666) Bremen won its autonomy from Sweden, to whom the secularized diocese had been ceded (to form a duchy) in 1648; but it was not till 1741 that the independence of the city, which had been made a free Imperial town in 1646, was acknowledged fully. In 1810 Bremen was incorporated into the French Empire, but it regained its freedom in 1813 and in 1815 became a member of the German Confederation. As a member of the German Empire, it remained outside of the *Zollverein* till 1888. A popular revolution in 1304 made the government of the city partly democratic; the liberal régime was confirmed in 1433 and 1534. The present Constitution was adopted in 1854. The Duchy of Bremen was ceded by Sweden to Hanover in 1719.

Consult: *Denkmale der Geschichte und Kunst der freien Hansestadt Bremen* (3 vols., Bremen, 1870); Reese, *Jahrbuch für Bremische Statistik* (Breslau, 1892); *Die Freie Hansestadt Bremen und Umgegend* (Bremen, 1893); V. Bippen, *Geschichte der Stadt Bremen* (Bremen, 1898).

BREMER, brā'mĕr, FREDRIKA (1801-65). A Swedish novelist, born near Åbo, Finland. Her father was an iron-founder, wealthy, and somewhat stern, her mother severe and impatient, the child affectionate, passionate, and restless, misunderstood and hindered in development. Her first writing was youthful poetry in French, produced when she was eight years old. Nursery dramas and a journal followed, with foreign travel that left her "conscious of being born with powerful wings, but conscious of their being clipped." She turned to works of charity, and to increase her means for these, published anonymously a series of romances under the general title, *Sketches of Every-Day Life* (1828-48). The first of these was *Axel and Anna* (1828). A second volume, *The H. Family* (1829-30), was a sensational success, and subsequent volumes won her an international public. She passed two years (1849-51) in America. Her early novels excel in descriptions of every-day middle-class life. They have the charm of unaffected simplicity and quiet humor. Noteworthy among them are: *Axel and Anna* (1828); *The President's Daughters* (1834); *Nina* (1835); *The Neighbors* (1837); *The Home* (1839). Later novels disclose the reformer, advocating philanthropy, religion, and especially the equal rights of women. Of these, *Hertha* (1857) and *Syskonlif* are the best. Her verse is unimportant. Of her books of travel, *Homes in the New World* (1853) contains her impressions of America. She died at Arsta December 31, 1865. An English life of Miss Bremer, with unpublished writ-

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ings, appeared in 1868. There are good English translations of the earlier novels, by Mary Howitt.

BREMERHAVEN, brā'mēr-hä'fen (Ger., port or haven of Bremen). A port on the Weser, about ten miles from its mouth, founded by Bremen in 1827, on ground acquired from Hanover, and now a part of the Bremen State (Map: Germany, C 2). (See BREMEN.) The population of Bremerhaven, though small, is steadily increasing: in 1870, 10,000; in 1880, 14,000; in 1890, 16,000; in 1900, 20,300.

BREND'AMOUR, brän'dȧ'mōōr', FRANZ ROBERT (1831—). A German engraver. He was born in Aix-la-Chapelle, and studied engraving in Cologne. In 1856 he founded a xylographic establishment in Düsseldorf which became one of the most important institutions of its kind in Germany, and which was followed by similar establishments in Berlin, Brunswick, Leipzig, and Stuttgart. Landscapes, the chase, and still life are the favorite subjects of Brend'amour. The following are some of his principal productions: 112 engravings after original drawings by Rudolph Elster (Paris and Düsseldorf, 1860); "Der Oberhof," by Immermann, with the illustrations by B. Vautier (Berlin, 1863); "Der Jäger," by Count Waldersee, with the original drawings by L. Beckmann (ib., 1863); "Landscapes of the Odyssey," after Preller (Leipzig, 1871).

BREN'DAN, or **BREN'AINN,** Saint, of Clonfert (484-577). A legendary hero. He was born at Littus li or Stagmum li, now Tralee, County Kerry, southwest Ireland; was educated under monastic influences and became a priest, but, filled with a great desire to travel, he went on a year's journey which took in the western and northern islands—e.g. The Hebrides, Shetland, and Faroe Islands, and also Brittany. Returning, he built a wooden ship, and in it went with a large party to the Continent of Europe and to unknown lands, the smaller 'Fortunate Isles.' Returning from his second voyage, he founded the monastery in what is now Clonfert, in County Longford, central Ireland. Later he visited Iona and the mainland of Scotland. His reputation as a traveler being thus established, he was made the subject of a legend in which angels became his guides and strange experiences befell him. He died in 577, and his day in the calendar is May 16. Upon pre-Columbus maps 'Saint Brendan's country,' i.e. the scene of his supposed geographical discoveries, was just south of the island of Antillia and west of the Cape Verde Islands. Consult: B. C. Schröder, *Sanct Brandan* (Erlangen, 1871); John Lanigan, *Ecclesiastical History of Ireland*, Vol. II. (Dublin, 1822); Francisque Michel, *Les voyages merveilleux de Saint Brandan à la recherche du paradis terrestre, légendes en vers du XII. siècle* (Paris, 1878); O'Donoghue, *Brendeniana* (London, 1894).

BREN'DEL, HEINRICH ALBERT (1827-95). A German painter of animal life. He was born in Berlin, and studied with Krause at the academy in that city, and with Palizzi and Couture in Paris. From 1854 to 1870 he lived in Paris. In 1875 he became professor at the Weimar Art School, and in 1881 he was appointed director of that institution. He excelled in the delineation of sheep; and most of the art galleries of Europe have examples of his art. Among his best works are: "Interior of Sheep Stable" (Hamburg Gallery); "Sheep Leaving Stable" (National Gallery, Berlin); "Peasant's Farm" (ib.).

BRENDEL, KARL FRANZ (1811-68). A German musical critic, born at Stolberg-am-Harz, in Prussia. He was educated at the universities of Leipzig and Berlin, lectured on the history of music in Freiberg and Dresden, and in 1844 became editor in Leipzig of the *Neue Zeitschrift für Musik*, established by Schumann in 1834. At the same time he was appointed an instructor in musical history and æsthetics at the Conservatorium. He made the *Zeitschrift* the organ originally of the movement led by Wagner and Liszt, and from 1861, of the Allgemeiner Deutsche Musikverein, founded in that year by himself, Liszt, and others for the purpose of reconciling hostile factions. He was president of the Verein until his death, and from 1856 to 1861 published a second periodical, *Anregungen für Kunst, Leben und Wissenschaft*. His publications include *Grundzüge der Geschichte der Musik* (1848); *Geschichte der Musik in Deutschland, Italien und Frankreich* (1852); and *Die Musik der Gegenwart und die Gesamtkunst der Zukunft* (1854).

BREN'EMAN, ABRAM ADAM (1847—). An American chemist and inventor, born in Lancaster, Pa. He graduated in 1866 at the Pennsylvania State College (State College P. O.), and from 1869 to 1872 was professor of chemistry there. From 1875 to 1879 he was assistant professor of industrial chemistry at Cornell University, and from 1879 to 1882 professor. In 1882 he became a chemical expert, and a lecturer and writer on chemical subjects, and in 1892 was elected vice-president of the American Chemical Society. He is known as the inventor of a process, called by his name, for making iron non-corrosive. His publications include *A Manual of Introductory Laboratory Practice* (1875; with G. C. Caldwell), and a *Report on the Fixation of Atmospheric Nitrogen* (1890).

BRENHAM, brĕn'am. A city and county-seat of Washington County, Tex., 75 miles west-northwest of Houston, on the Gulf, Colorado and Santa Fé, and the Houston and Texas Central railroads (Map: Texas, F 4). It is in an agricultural and cotton-raising region, and has cotton-compresses, cotton-factory, cottonseed-oil mill, foundries, machine-shops, and manufactures of furniture, plows, wagons, soap, etc. Brenham is the seat of the Blim Memorial and Evangelical Lutheran colleges, and has a public library, two parks of note, and fair-grounds. Settled in 1844, Brenham was first incorporated in 1866, and at present is governed under a charter of 1894, which provides for a mayor, elected every two years, and a city council. The waterworks are owned and operated by the municipality. Population, in 1890, 5209; in 1900, 5968.

BRENKENHOF, brĕŋ'ken-hōf, FRIEDRICH BALTHASAR SCHÖNBERG VON (1723-80). A Prussian statesman. He was born at Reideburg, near Halle, and became equerry of Prince Leopold of Anhalt-Dessau. During the Seven Years' War he greatly facilitated the rapid marches of Frederick the Great by secretly and expeditiously furnishing the necessary supplies, chiefly horses, to the Prussian army. In recognition of his valuable aid, he was afterwards invited to enter the service of Prussia, and was intrusted with the task of restoring order and prosperity to

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the devastated eastern provinces. He rebuilt cities, founded settlements, encouraged the industries, and constructed numerous canals. After his death it was found that his accounts were irregular, and, in consequence, his estates were confiscated by the King, though afterwards returned to the family.

BREN'NAN, THOMAS FRANCIS (1853—). An Irish Roman Catholic prelate, born in Tipperary. He studied at Allegheny College (Allegheny, Pa.), at Rouen, and at Innsbruck, and was for some time connected with missionary work in the State of Pennsylvania. In 1891 he was consecrated Bishop of Dallas, Tex. He was vicar-apostolic of Labrador from 1893 to 1894, and from 1894 to 1895 Auxiliary Bishop of Newfoundland. Since that time he has been resident in Italy as acting Auxiliary Bishop of Albano and Frascati.

BREN'NER, RICHARD (1833-74). A German explorer, born at Merseburg. During 1864 and 1865 he accompanied Baron von der Decken upon his expedition along the eastern coast of Africa. After the attack made upon the exploring party by the natives, October 1, 1865, he made his way with great difficulty to Zanzibar and thence to Germany. On behalf of von der Decken's family, and in association with Kinzelbach, he here organized an expedition for the purpose of ascertaining the fate of the Baron (1866-68). He afterwards visited the southern part of the Galla country, of which region he was the first to prepare a chart. In 1870 he undertook an extensive commercial tour to Aden, the Persian Gulf, and the coast of East Africa.

BRENNER PASS. A mountain pass of the Tyrol, Austria, the lowest over the main chain of the Alps (q.v.). It is on the route uniting Innsbruck with Bozen (Map: Austria, B 3). The summit, which is 4490 feet above the sea, and 25 miles south of Innsbruck, lies on the watershed between the Black and Adriatic seas. Lofty mountains rise above it on every side. The Brenner Pass was used by the Romans. It was made available for carriages in 1772, and in 1867 a railway was opened which passes over sixty-seven bridges and through twenty-two tunnels (one of which is over 2800 feet long). It connects the railway systems of Germany and Austria with that of Italy. It is the shortest route between central Germany and Italy. The railway was begun by the Austrian Government when Venetia belonged to the Austrian Empire, with the view of facilitating the military operations and of restoring the commercial prosperity of Venice by making it the port of southern Germany. The prosecution of the work was not arrested by the political changes which took place. A liberal commercial treaty between Austria and Italy, binding the two countries together in community of interest, restored the natural state of things, with which political animosities had long interfered. The pass takes its name from the village of Brenner at its summit. The most picturesque portions lie between Innsbruck and Gossensass. The steepest gradient is 1 in 40. The distance from Innsbruck to Bozen in a direct line is only 52 miles, but by the windings of the road or of the railway it is much increased.

BRENNGLAS, brĕn'gläs, ADOLF. A pseudonym of Adolph Glassbrenner (q.v.).

BREN'NORALT, OR THE DISCONTENTED COLONEL, kûr'nel. A posthumous tragedy by Sir John Suckling, published in 1646, in a volume entitled *Fragmenta Aurea*. It was an expansion of an earlier play (1640), the title of which furnished the subtitle of the revision. It was revived at the Theatre Royal March 5, 1668. The scene is laid in Poland, and the lines contain striking allusions to political events of 1639.

BREN'NUS (Celt. *brennin*, king, or Welsh and Ir. *bran*, raven). The Latin form of a Celtic name borne by several Gallic chieftains. (1) The most famous Brennus was that leader of the Gauls who, about B.C. 390, crossed the Apennines, and hurrying through the country of the Sabines, at the head of 70,000 men, encountered and overthrew the Roman army on the banks of the Allia. Had the barbarians immediately followed up their advantage, Rome might have been obliterated from the earth; but instead of doing so, they abandoned themselves to drunken revelry on the battlefield, and gave the Romans time to fortify the Capitol, whither were removed all the treasures and holy things of the city. When Brennus entered the gates he found that all the inhabitants of the city had fled, with the exception of the women and children, and aged Senators, the last of whom, with pathetic heroism, had resolved not to survive the destruction of their homes, and so the chief among them, clothed in their robes of sacerdotal or consular dignity, and sitting in the curule chairs, awaited the approach of their enemies, and suffered death in majestic silence. Brennus, having plundered the city, now besieged the Capitol for six months. During the beleaguerment occurred the famous night attack, which would have been successful had not the cackling of the geese kept in Juno's temple awakened the garrison. At length, however, the Romans were compelled to enter into negotiations with the besiegers. They offered 1000 pounds of gold for their ransom, which was agreed to. According to Polybius, Brennus and his Gauls returned home in safety with their booty; but the rather mythical Roman traditions affirm that, just as the Gauls were leaving the city, Camillus, who had been recalled from banishment and appointed dictator, appeared at the head of an army, attacked them, and, in two bloody battles, slew them to a man. The whole story of Brennus is evidently a mere legend, based upon facts which the Roman historians, from patriotic motives, falsified. It is probable that the Greeks in reality held possession of parts of Italy for some time, and that their great rout by Camillus is pure fiction.

(2) Another BRENNUS, who occupies a conspicuous place in history, was that Gallic chief who invaded Greece, B.C. 279, at the head of 150,000 foot and 61,000 horse. After desolating Macedonia, he forced his way through Thessaly to Thermopylæ (B.C. 278). The Grecian army fled at his approach. Brennus rushed on with a division of his great host to Delphi, which he had resolved to plunder; but the Delphians, having taken up a very advantageous position on some rocks, resisted his further progress. Assisted by the terrors of an earthquake and a terrible storm, and, according to reverential tradition, by the supernatural help of Apollo, they utterly routed the Gauls, who fled in dismay. Brennus was

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taken prisoner, and drank himself to death in despair.

BREN'TA (anciently, Lat. *Brinta*, or *Brentesia*). A river of North Italy. It issues from Lake Caldonazzo in the Austrian Province of Tyrol, flows through the Sugana Valley, then south through Venetia, finally turning eastward, and empties into the Gulf of Venice (Map: Italy, F 2). It originally emptied at Fusina, but to prevent inundations the main stream was diverted at Dolo southward into the Gulf of Venice just below Chioggia; while the old channel has been transformed into a canal between Venice and Padua. Below Bassano, where the Venetian plains begin, the river flows between dikes. The total length of the Brenta is 106 miles, of which 56 are navigable.

BRENTANO, brĕn-tä'nô, CLEMENS (1778-1842). A German novelist and poet. He was born in Ehrenbreitstein, studied in Jena, lived in Frankfort, Heidelberg, Vienna, and Berlin, and for a time at a cloister in Dülmen, near Münster (1818). Thence he went to Regensburg, Munich, and Frankfort. He died in Aschaffenburg, July 28, 1842. Brentano's early comedies, among them *Die lustigen Musikanten* (1803) and *Ponce de Leon* (1804), show lyric ability and a peculiar wit, while the drama *Die Gründung Prags* (1815) is a fantastic and bizarre production of undeniable power. His best work is in short stories, particularly in his fairy stories. The simplicity of his *Geschichte vom braven Kasperl* (1817) and of *Gockel, Hinkel und Gackeleia* (1838) is in pleasant contrast to the mystic romanticism of some of his other work. His most enduring contribution to literature is the compilation, with Arnim, of German ballads in *Des Knaben Wunderhorn*. He was an erratic member of a whimsically brilliant family. His grandmother, Sophie La Roche, had been a close friend of Wieland; his mother, Maximiliane, figures in Goethe's life, as does his sister, Bettina von Arnim (q.v.).

BRENTANO, FRANZ (1838—). A German philosopher, born in Marienberg. He was for a time a professor of philosophy in Würzburg, and from 1874 to 1880 in Vienna. His works comprise *Psychologie des Aristoteles* (Mainz, 1867); *Psychologie vom empirischen Standpunkt* (Leipzig, 1879); and *Neue Rätsel* (Vienna, 1878).

BRENTANO, LORENZ (1813-91). A German-American politician and editor, born in Mannheim. After study in Heidelberg and Freiburg, he began legal practice, entered public life, and in 1848 was elected to the National Assembly at Frankfort. In 1849 he was placed in control of the Provisional Government of Baden, but soon fell under suspicion among his fellow revolutionists, and fled by way of Switzerland to America. He established *Der Leuchtturm*, a German anti-slavery journal, in Pottsville, Pa., and from 1862 to 1867 was editor-in-chief of the *Illinois Staatszeitung* in Chicago. He was appointed to the American consulate at Dresden in 1872, and in 1876 was elected to Congress. As editor of the *Staatszeitung*, he greatly aided the Federal cause during the Civil War period.

BRENTANO, LUJO (1844—). A German political economist. He was born in Aschaffenburg, Bavaria; studied at the universities of Dublin, Heidelberg, Munich, Würzburg, and Göttingen, and with Ernst Engel, the statistician, made an investigation of the English trades-unions. He has been professor of political economy successively in Breslau (1873), Strassburg (1882), Vienna (1888), Leipzig (1889), and Munich (1891). His more important publications include *Die Arbeitergilden der Gegenwart*, 2 vols. (1871); *Das Arbeitsverhältnis gemäss dem heutigen Recht* (1877); *Der Arbeiterversicherungszwang, seine Voraussetzungen und seine Folgen* (1881); *Ueber das Verhältnis von Arbeitslohn und Arbeitszeit zur Arbeitsleistung* (2d ed., 1893); *Agrarpolitik*, Vol. I. (1897).

BRENT'FORD ('the ford on the Brent'). The county town of Middlesex, England, on the Brent, at its confluence with the Thames, 3 miles west-southwest of London, and where the Thames is crossed by a bridge leading to Kew. It consists chiefly of one long, irregular street. It has extensive manufactories, among them being gin-distilleries, breweries, soap-works, sawmills, etc.; and there are many market gardens in the vicinity. Population, in 1891, 13,738; in 1901, 15,171. Here Edmund Ironside defeated the Danes in 1016; and in 1642 the Royalists, under Prince Rupert, defeated the Parliamentarians, under Colonel Hollis. There are frequent allusions to it in English literature. Consult Watts, "Old Brentfordtown," in the *Art Journal* (London, 1901).

BRENTFORD, TWO KINGS OF. The name given two of the cast in Buckingham's *Rehearsal*. Though individual, they seem to have a common identity, for they always enter at the same time and enact precisely the same part. They have become proverbial.

BREN'TON, WILLIAM (? -1674). An American colonist, prominent in the early history of Rhode Island. He emigrated from England to Massachusetts in 1633, but removed to Portsmouth, Rhode Island, five years later, and in 1639 assisted in the founding of Newport. He was deputy governor of Aquidneck from 1640 to 1647, and again from 1662 to 1665; was president of Providence Plantations from 1660 to 1662; and was Governor of Rhode Island and Providence Plantations, under the new charter of 1663, from 1666 to 1669.

BRENZ, brĕnts, JOHANN (1499-1570). A German reformer. Under the influence of Luther he reorganized his church at Hall, Suabia, but at the time of the Smalkaldic War, in 1546, he was obliged to flee to Württemberg. He was appointed minister of the Collegiate Church of Stuttgart in 1553, and is said to have been the first exponent of the Reformation there. In the controversies between Zwingli and Luther, he took the side of the latter, and with others wrote the famous *Syngramma Suevicum* (1525). He was a writer of great ability and popularity. One of his teachings was that the body of the Lord is everywhere present; hence his followers were called 'Ubiquitarians.'

BRERA, brā'rà (*brera* for *breda*, from Lat. *prædium*, the estate, manor). The Palace of Science, Letters, and Arts in Milan. It was erected by Ricchini for a Jesuit college in 1651. It contains a library of 300,000 volumes (founded in 1770), a collection of 50,000 coins, a magnificent collection of paintings (confined chiefly to Italian artists, however), an archæological museum, and a good collection of casts from

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antique works. In its courtyard stands Canova's bronze of Napoleon I. as Roman Emperor.

BRESCIA, brĕ'shâ (anciently Lat. *Brixia*, founded by the Etruscans). An episcopal city of Lombardy, Italy (Map: Italy, E 2), capital of the Province of Brescia, 52 miles east of Milan. It is situated in a fertile plain at the foot of the Alps, on the Mella and the Garza, and is dominated by a citadel known as the Falcone d'Italia, that overlooks it from the rocky steeps on the north. Of the sixty-five churches that prospered at the time of the Venetian Republic, less than half are used for worship to-day. The old cathedral, generally called La Rotonda, from its massive dome structure, dates partly from the Ninth Century, partly from the Twelfth. The new cathedral, begun in 1604, but not completed until the Nineteenth Century, is one of the best examples of Seventeenth Century architecture. The magnificent city hall, called La Loggia, the exterior of which is covered with ornamentation, was begun in 1489, on the ruins of a temple of Vulcan. The Broletto is a massive Twelfth Century building, once the city hall, but now containing the courts of justice.

The Roman Museum occupies a Corinthian temple excavated in 1822, and originally erected by Vespasian in A.D. 72. It is exceedingly picturesque, and holds many valuable Roman antiquities. The Mediæval Museum also contains numerous treasures. In the Palazzo Tozio, bequeathed to the town by Count Tozio, and in the Palazzo Martinengo, are important collections of ancient and modern paintings, engravings, and statuary. The library, bequeathed to the town in 1750 by Cardinal Quirini, has over 80,000 bound volumes and 1500 manuscripts, among them a Ninth Century Book of the Gospels, a Tenth Century Harmony of the Gospels by Eusebius, and a Dante manuscript. The number of works in the town, both *al fresco* and in oils, by Alessandro Bonvicino, called Il Moretto, is accounted for by the fact that he was born and passed most of his life in Brescia.

The city has many charitable institutions, a street railway, a theatre, a lyceum, several gymnasia, botanical gardens, and various academies, among them the Accademia de' Filarmonici, which is one of the oldest in Italy. Water from Mombiano is distributed by an aqueduct to 72 public and 400 private fountains. The most important manufactures are of iron, and many firearms are made here for the Italian Army. The spinning, weaving, and working up of silk, flax, cotton, and wool into various articles of use and adornment furnish employment to many laborers. There are also oil and paper factories. The trade in all these articles, and in wine, particularly *vino santo*, is very extensive, and there is a large amount of general commerce, Brescia being a centre of transportation by both rail and highway. Population, in 1894, 67,700; in 1901, 70,614. The inhabitants of the ancient Brixia were allied with the Romans when Hannibal crossed the Alps. It was destroyed by the Huns, but soon rebuilt, and afterwards passed through the hands of the Ostrogoths, the Lombards, Charlemagne, and the Germans. In 1428 it came into the possession of Venice, and at the beginning of the Sixteenth Century was one of the wealthiest cities of Lombardy; but it never recovered its former importance after being sacked and burned in 1512 by the French under Gaston de Foix. In the rising of 1848 against Austria the citizens of Brescia took an active part, and after the battle of Custozza and the capitulation of Milan, shared the fate of other Lombard cities. In March, 1849, it was the only large city of Lombardy which rebelled, and, after the defeat of the Piedmontese at Novara, was bombarded and taken by Haynau, and had to pay an indemnity of over $1,200,000. In the War of 1859 it stood again by the side of Piedmont, and in 1860, with the rest of Lombardy, became a part of the Kingdom of Italy.

BRESLAU, brĕs'lou (Pol. *Wroclawia*, also *Wracislawia*, *Braclaw*, Med. Lat. *Wratislaria*, from King Wracislaw or Wratislaw). The capital of the Province of Silesia, Prussia, and third royal residence, situated at the confluence of the Ohlau and Oder, about 200 miles southeast of Berlin, in latitude 51° 7′ N. and longitude 17° 2′ E. (Map: Prussia, G 3). The Oder divides it into two parts, which are connected by numerous handsome bridges. It consists of the inner or main town and five suburbs —called the Ohlau, Sand, Oder, Nikolai, and Schweidnitz suburbs. The ancient fortifications have been converted into beautiful promenades, and the moat has been transformed into an ornamental sheet of water. The streets of the new portion of Breslau are spacious and regular, and the houses stately and handsome, affording a pleasant contrast to the sombre, massive structures of the old town. The city has many churches, the most remarkable being the Protestant church dedicated to Saint Elizabeth, with a steeple 300 feet in height (the highest in Prussia) and a splendid organ, and the Roman Catholic Cathedral, founded in the Twelfth Century, containing many works of art in sculpture and painting. Among the other noteworthy buildings is the lately restored Rathaus, dating from the Fourteenth Century. Breslau is the largest and most important city of Prussia, after Berlin. Its proximity to the Russian frontier makes it a highly important trading centre in raw products. It holds three annual fairs, besides a number of special markets, e.g. in leather, horses, and cattle. Its position in the centre of the manufacturing districts of the province, and its railway connections with all the important cities, in addition to the facilities of communication which the Oder affords, increase still further its commercial importance. It has manufactures of linen, woolens, cotton, silks, lace, jewelry, machines, earthenware, soap, alum, starch, etc., and upward of one hundred distilleries, and a trade in corn, coal, metals, timber, hemp, and flax. The city is administered by a municipal council of 102 members, who elect an executive board of 27 for the practical administration of the municipal affairs. (See PRUSSIA, Local Government.) The municipality owns and operates two gas and two electric-lighting plants, supplying all public and private buildings. The waterworks are also in the hands of the municipality. For local passenger traffic, the city has six railway lines, operated by electricity since 1901, as well as omnibuses and small river steamers. These are in the hands of private companies. Unlike the majority of German cities, Breslau still imposes the burden of street-cleaning upon the property-owners. It has an excellent system

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of sewerage and sewage farms, on the general plan of those of Berlin, which have proved so successful. Educational institutions are numerous, and include a university with a library containing over 300,000 volumes, six high schools (three belonging to the city), a good system of public elementary schools, a municipal library of 150,000 volumes, and two museums. The city is richly provided with hospitals and charitable institutions. In addition to the university clinic, there are two hospitals and an asylum under municipal control, as well as four orphan asylums.

Breslau is a city of Polish origin. It passed from the suzerainty of Poland in 1335 to Bohemia, and in 1527 to Austria, from which it was taken by Frederick II. of Prussia in 1741. Sixteen years afterwards it was captured by the Austrians, after a bloody battle, but was retaken by Frederick in about a month. In 1807 it surrendered to the French. Soon after its fortifications were demolished. Population, in 1890, 335,000; in 1900, 423,000.

Consult: Korn, *Breslauer Urkundenbuch* (Breslau, 1870); Stade, *Breslau* (Hamburg, 1895); Wutke, *Die breslauer Messe* (Hamburg, 1895).

BRESSANI, brĕs-sä'nê, Francesco Giuseppe (1612-72). An Italian Jesuit missionary among the Indians of Canada. In 1644 he was sent to the Huron country, but was captured and tortured by the Iroquois. After great suffering he was sent to the Dutch Settlements at Fort Orange (Albany), whence he was ransomed for a large sum. He returned to France, but came back to resume his missionary work in 1645, and labored among the Hurons until 1650, when, broken in health, he returned to Italy. He published *Relazione dei missionari della compagnia de Gesù nella Nuova-Francia* (1653), an English translation of which appeared in Montreal in 1852.

BRESSAY, brĕs'sâ. One of the Shetland Islands (q.v.), Scotland, east of Mainland, separated from Lerwick by Bressay Sound (Map: Scotland, G 1). Area, 12 square miles. It supplies the Shetland Islands with slates. Population, in 1901, 1686, chiefly fishermen. East of Bressay, separated by a narrow and dangerous sound, is the most remarkable of Shetland rock phenomena, an islet called Noss, sourrounded by perpendicular cliffs 300 to 500 feet high, culminating in the Noup, a fine peaked headland 600 feet high. Bressay and Noss are important breeding-grounds for Shetland ponies.

BRESSLAU, brĕs'lou, Harry (1848—). A German historian of Jewish extraction. He was born at Dannenberg, Hanover, and studied history at the universities of Göttingen and Berlin. In 1870 he was appointed teacher at the *realschule* of the Jewish congregation in Frankfort-on-the-Main, where he remained until 1872, when he was called to the Andreas Realschule at Berlin, in the same capacity. Simultaneously he became private lecturer at the Berlin University, and was appointed extraordinary professor at that university in 1877. He was appointed a member of the central directorate of the Monumentia Germaniæ Historica in 1888, and at the time also became editor of the publication entitled *Neues Archiv der Gesellschaft für ältere deutsche Geschichtskunde*. His appointment to the chair of history at Strassburg University followed in 1890. Among his numerous writings are the following: *Diplomata Centum* (Berlin, 1872); *Jahrbücher des deutschen Reichs unter Kaiser Heinrich II.*, Vol. III. (1879); *Jahrbücher des deutschen Reichs unter Konrad II.* 12 vols. (1879-84); *Zur Judenfrage Sendschreiben an Heinrich von Treitschke* (2d ed., 1880); "Die Kassettenbriefe der Königin Maria Stuart," in the publication entitled *Historisches Taschenbuch* (1882).

BREST (anciently, Lat. *Gesocribate;* according to others *Gesobrivates*, or *Brivates Portus*). A strongly fortified seaport of Brittany, France, in the Department of Finistère, at the mouth of the Penfeld, on the Bay of Brest, 389 miles west of Paris by rail (Map: France, B 3). Le Goulet, the entrance to the bay, scarcely a mile wide, is protected by powerful batteries. The harbor, one of the chief naval stations of France, contains military and naval ports, fully equipped with floating and graving docks, quays, piers, and a breakwater, completed in 1876 at a cost of 22,500,000 francs ($5,500,000). A modernized citadel, whose foundations date from the Thirteenth Century, dominates the city and harbor, which are also protected by batteries. The city itself is old, dirty, and has steep, crooked streets. The public institutions consist of a botanical garden, lyceum, naval schools, naval library, marine and civil hospitals, and a free library. The Cours Dajot, a beautifully wooded promenade, overlooks the commercial port and breakwater. The only industry is connected with the furnishing of navy supplies and the equipment and the repair of ships, especially warships. Brest has submarine telegraphic communication with the United States. The United States is represented by a consular agent. Brest came into national importance when it was converted into a great fortress by Vauban toward the close of the Seventeenth Century. Since then it has been considerably strengthened. The population consists largely of naval and seafaring people. Population, in 1896, 74,538. Consult *L'Annuaire historique et statistique de Brest* (Brest, 1899).

BREST-LITOVSK, brĕst'lê-tôfsk' (Russ., Lithuanian Brest, Pol. *Brzesć-Litewski*, anciently *Berestye*, *Berestov*, 'the elm city,' from *berestŭ*, elm). A first-class fortress and capital of a district in the Government of Grodno, Russia, situated 131 miles south of Grodno, at the junction of the Mukhavetz and the Bug (Map: Russia, B 4). Population, in 1897, 46,500, including 27,000 Jews. Brest-Livotsk is one of the oldest Slav towns, and belonged to Poland till 1795. At the Church congresses held here in 1590, 1594, and 1596, the union of the Eastern and Western churches, recognizing the supremacy of the Pope, but retaining the Eastern ritual and the Slavonic language in worship, was proclaimed, notwithstanding the protests of the Russian and Greek representatives. Although but little manufacturing is carried on, the town is of considerable commercial importance, situated as it is on the inland waterway from the Baltic to the Black Sea, and at the intersection of the railroads connecting Odessa with Königsberg and Moscow with Warsaw. Two fairs are held annually.

BRETAGNE, bre-tä'ny'. See Brittany.

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BRETEUIL, bre-tē'y', Louis Auguste Le Tonnelier, Baron de Preuilly (1733-1807). A French diplomat and statesman. He was appointed, in 1758, after several years of military service, envoy to the Elector of Cologne, and Minister to Sweden in 1769. Subsequently he was also Minister at Vienna and Naples. In 1783-87 he was Minister of State, a steadfast royalist, opposed to all concessions to the Third Estate. In 1789 he was appointed to succeed Necker, but his ministry was brought speedily to a termination by the capture of the Bastille. Having counseled the King to escape across the frontier and seek foreign aid, he himself withdrew to Solothurn, Switzerland, where he was appointed royal agent to treat with foreign powers regarding the restoration of the monarchy. In 1802 he was permitted to return to France, but thenceforth took no part in politics.

BRETHREN, Bohemian. The name of a religious society which was first instituted in Bohemia about the middle of the Fifteenth Century. It was originally composed of remnants of the Hussites. Dissatisfied with the conduct of the Calixtines (q.v.), they betook themselves, in 1453, to the borders of Silesia and Moravia, where they settled. Here they dwelt in separate communities, and were distinguished by the name of Brothers of the Rule of Christ. Their adversaries often confounded them with the Waldenses and Picards, while, on account of their being compelled during persecutions to hide in caves and solitary places, they were also called cave-dwellers (*Grubenheimer*). In spite of oppression, such was the constancy of their faith and purity of their morals, that they became profoundly respected, and their numbers greatly increased. The chief peculiarity of their creed was the denial of the Catholic doctrine of transubstantiation; but in truth they rejected tradition generally, and professed to found their tenets only on the Bible. Their ecclesiastical constitution and church discipline—of which the Lutheran reformers spoke highly—was a close imitation of that of the primitive Christian communities. Under the impression that religion should consciously penetrate and characterize the entire life of men, they extended ecclesiastical authority over the very details of domestic life. Their chief functionaries were bishops, seniors and conseniors, presbyters or preachers, ædiles, and acolytes. The nucleus of the sect was the following of Peter Chelczicky, a layman of the nobility. To them Rokyzana, the Utraquist leader, sent Gregor in 1457, and he led them when persecution broke out to Kunwald, in Bohemia, near Königgrätz, whence, however, they were driven to the mountains. Gregor died in 1474. Their next great man was Luke of Prague, who brought them into literary contact with the Waldenses. The latter translated some of their writings, and these translations have frequently been taken for original Waldensian works; for the Bohemian Brethren had literary intercourse with the Waldenses, but the differences between them prevented union. They had also ecclesiastical intercourse, for their bishop, Matthias of Kunwald, was consecrated by a bishop of the Bohemian Waldenses. It was against their principles to engage in war; and having on several occasions refused to take up arms, they were at last deprived of their religious privileges. The result was that in 1548 about a thousand of the brethren removed to Poland and Prussia. The contract which these exiles entered into with the Polish reformers at Sandomir, April 14, 1570, and still more the religious peace concluded by the Polish States in 1572, secured their toleration; but subsequently, in consequence of the persecutions of King Sigismund III., they united themselves more closely to the Protestants, though even at the present day they retain something of their old ecclesiastical constitution. The brethren who remained in Bohemia and Moravia obtained a little freedom under the Emperor Maximilian II., and had their chief seat at Fulnek, in Moravia. In the Seventeenth Century a number removed into Hungary, but during the reign of Maria Theresa were coerced into Catholicism. The Thirty Years' War, so disastrous to the Bohemian Protestants, entirely broke up the societies of the Bohemian Brethren; but afterwards they united again, though in secrecy. Their exodus about 1722 occasioned the formation, in Lusatia, of the *United Brethren*, or Herrnhuters. See Moravians.

BRETHREN, Plymouth. See Plymouth Brethren.

BRETHREN, River. See River Brethren, The.

BRETHREN, White. A sect of the Fifteenth Century, that sprang up in the Italian Alps. Their leader claimed to be Elias the prophet. They were clad in white, and carried crucifixes from which blood appeared to come. The leader, who appears to have left no name, prophesied the destruction of the world, and for a time had great success; but Boniface IX. seized the prophet and burned him at the stake, and within a year the sect passed out of existence.

BRETHREN OF THE LORD, The. A term which occurs but once in the New Testament (I. Cor. ix. 5: "Have we no right to lead about a wife that is a believer, even as the rest of the apostles and the brethren of the Lord and Cephas?"), though the phrase 'the Lord's brother' is used once of James (Gal. i. 19: "But other of the apostles saw I none, save James, the Lord's brother."). In view of these and other passages that refer apparently to actual brothers and sisters of Jesus, giving the names of the former as James and Joses (Joseph) and Judas and Simon (Matt. xii. 46-50; and parallels, xiii. 55; xxviii. 10; Mark vi. 3; John ii. 12; vii. 3, 5, 10; xx. 17; Acts i. 14), there has existed, ever since the Patristic Age, a large controversy regarding the degree of consanguinity involved in the above term.

Three views have obtained: (1) The Helvidian—first asserted by Tertullian (c.208 A.D.) and restated by Helvidius (c.380 A.D.)— that these brethren were later sons of Mary by Joseph, the reputed father of Jesus. (2) The Epiphanian—first appearing in the Second Century apocryphal books, the Gospel of Peter and the Protevangelium of James, and chiefly supported by Epiphanius (c.370 A.D.)—that these brethren were sons of Joseph by a former marriage. (3) The Hieronymian — promulgated by Jerome (c.380 A.D.)—that these brethren were cousins of Jesus, being sons of Clopas or Alphæus, the husband of a sister of Mary.

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Of these views, the first is fatal to, while the latter two sustain, the theory of the perpetual virginity of Mary.

Consult: For the first view, J. B. Mayor, Introduction to his *Commentary on James* (London, 1897); for the second view, J. B. Lightfoot, Excursus in his *Commentary on Galatians* (Cambridge and London, 1887); for the third view, P. Schegg, *Jakobus der Bruder des Herrn* (Munich, 1883). See JAMES.

BRETIGNY, bre-tē'nyē'. A village of France, in the Department of Eure-et-Loir, about six miles southeast of Chartres, on the railway between Paris and Orleans. At Bretigny, on May 8, 1360, Edward III. concluded a treaty with France, by which the French King, John II., was released from captivity in England, on agreeing to pay 3,000,000 écus of gold (about $8,000,000) for his ransom. Edward renounced his pretensions to the crown of France, his title to Normandy, Anjou, Maine, and Touraine, and the suzerainty over Brittany and Flanders; but was confirmed in his possession of Guienne and Gascony, and received in addition Poitou, Saintonge, Calais, and a number of other places. See FRANCE.

BRETON, bre-tōn', GILLES LE (? -1550). A French architect. He built the most interesting parts of the famous Château of Fontainebleau (q.v.) between 1528 and his death in 1550, when he was succeeded by Philibert de l'Orme (q.v.).

BRETON, JULES ADOLPHE (1827—). A French painter, excelling in rural life and themes. He was born at Courrières, May 1, 1827. He studied under Devigne and Drolling. Among his paintings are: "The Gleaners;" "Evening;" "Blessing the Grain;" "The Weeders;" "The End of the Journey," etc. He published *Les champs et la mer*, poems (1875); *Jeanne*, a poem, for which he received the Montyon Prize of the French Academy (1876); and *The Life of an Artist* (1890). This latter work is a frank and simple statement of the emotions of an artistic temperament happily employed; full, also, of valuable suggestions and shrewd criticism. Breton is peculiarly successful in depicting the scenes, customs, and avocations of the rural people among whom he was born and with whom he has passed the most of his life, except for an occasional visit to Paris for the purpose of viewing the annual Salon and renewing old-time friendships of his student days. His pictures have always honest sentiment, and he has received well-merited appreciation from the public. He was made Commander of the Legion of Honor in 1889, and has received many medals. Consult: Breton, *Autobiographie* (Paris, 1891); Muther, *History of Modern Painting* (London, 1896); Stranahan, *A History of French Painting* (New York, 1899); Gautier, *Abécédaire du Salon* (Paris, 1861).

BRETON DE LOS HERREROS, brâ-tōn' dâ lōs â-rā'rōs, DON MANUEL (1796-1873). A popular modern Spanish poet. He was born at Quel, in the Province of Logroño, was educated in Madrid, and after eight years of military service held several positions under the Government, but always lost them on account of his free expressions of liberal opinion. His first essay in the drama was *A las vejez viruelas*, which, in 1824, was produced with great success. Other plays followed in rapid succession, numbering altogether more than 150, partly original, partly translations from earlier Spanish classics, and partly translations from the Italian and French, some of which were very popular. His best and most ambitious play is the *Escuela del matrimonio*, being an admirable picture of average Spanish social life, with just the needed touch of irony to relieve it. Had he been content to write less, he might have left a more enduring fame. His collected works, edited by himself, appeared in Madrid (1850-52) in five volumes. A better edition is that of Breton y Orozco (5 vols., Madrid, 1883).

BRET'ON LITERATURE. The Breton, or Armorican, language belongs to the British subdivision of the Celtic family of languages. (See CELTIC LANGUAGES.) In its earliest form it was spoken in Britain, and closely resembled Cornish. As a result of social and political disturbances in Britain, many of the Celtic inhabitants emigrated during the Fifth and Sixth centuries to what is now French Brittany. The language that they planted there was known as Breton or Armorican. It was strongly influenced by French, as time went on, and in the Middle Breton period a large part of the vocabulary came to be of Romance origin. The Celtic language was entirely driven out of Upper Brittany by French, but in Lower Brittany it is still spoken by more than a million people. In modern Breton four distinct dialects are recognized—those of Léon, Tréguier, Cornouailles, and Vannes. The Vannetais stands rather apart from the other three.

The material for the study of Old Breton consists entirely of glosses and lists of proper names, of which there is a considerable quantity in manuscripts ranging from the Eighth to the Tenth Century. The oldest literary monuments that have been preserved are Middle Breton; and like those in Cornish, they are almost entirely of a religious character. A number of the most important texts are accessible in recent editions.

During the Nineteenth Century there was a kind of literary revival in Brittany. In 1827 the Bible was translated into Breton by Le Gonidec. In 1839 appeared the first edition of *Barzaz Breiz*, by Hersart de la Villemarqué, a book which gave rise to a long discussion resembling, on a smaller scale, the controversy over Macpherson's *Ossian*. The *Barzaz Breiz* was finally discredited as a reproduction of Breton popular poetry, but it gave an impulse to the work of more scientific collecting which has gone on steadily to this day. The most valuable publications in this field have been those of M. F. M. Luzel.

At the present time in Brittany, as in the other Celtic countries, an active effort is being made to preserve the native language and to promote its use in literature.

BIBLIOGRAPHY. For Old and Middle Breton monuments consult: Loth, *Chrestomathie Bretonne* (Paris, 1890); *Le Mystère de Sainte Barbe* edited by Ernault (Paris, 1888), contains a Middle Breton vocabulary, and the same scholar has since published a separate dictionary of Middle Breton. An important bibliography of modern Breton materials was contributed by Gaidoz and Sebillot to the *Revue Celtique*, Vol. V. (Paris, 1875).

BRETSCHNEIDER, brĕt'shnī-dĕr, HEINRICH GOTTFRIED VON (1739-1810). A German remarkable for his unsettled life, eccentric habits,

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and satirical writing. He was born at Gera, and was educated first at the Institute of the Moravian Brothers, at Elbersdorf, and afterwards at the gymnasium at Gera. He became captain of horse in a Prussian volunteer corps, in which service he was taken prisoner, and was confined in a French fortification until 1763. In 1775 he visited England, France, and Holland; in 1776 he entered the service of the Austrian Government, and in 1778 was nominated librarian of the University of Buda, where he was persecuted by the Jesuits, whose hatred he had incurred. This circumstance brought him under the notice of the Emperor, Joseph II., who, in 1782, appointed him one of the inspectors of studies. He was the author of many tales, poems, and satires. The latter are attacks upon every kind of injustice and falsehood. In his *Almanac of the Saints* (*Almanach der Heiligen*), for the year 1788, the priesthood is severely attacked, and the legends of the monks ridiculed.

BRETSCHNEIDER, KARL GOTTLIEB (1776-1848). A German Protestant theologian. He was born at Gersdorf, Saxony; studied at the University of Leipzig; was a lecturer on philosophy and theology at Wittenberg from 1804 to 1806; and in 1807 became pastor at Schneeberg. In 1816 he was appointed superintendent-general and a member of the supreme consistorial court at Gotha. He was a representative of the school of so-called rational supranaturalism, whose intermediate position is indicated by its name. His many and varied works display scholarly acuteness and literary skill, but lack speculative depth. His *Probabilia de Evangelii et Epistolarum Joannis Apostoli Indole et Origine* (1820) aroused considerable controversy. He is best known for the *Systematische Entwickelung aller in der Dogmatik vorkommenden Begriffe* (1814; 4th ed., 1838); and in particular for the *Lexicon Manuale in Libros Novi Testamenti* (2 vols., 1824; 3d ed., 1840). He established the *Corpus Reformatorum* (Halle, 1834 et seq.); and from 1832 was editor of the *Allgemeine Kirchenzeitung* of Darmstadt. A part of his autobiography (1851) is to be found translated in *Bibliotheca Sacra*, Vols. IX and X.

BRETT, WILLIAM BALIOL. See ESHER, WILLIAM BALIOL BRETT, First Viscount.

BRET'TEN (in the Eighth Century, *Bredaheim*). A town of Baden, on the Saalbach, about 13 miles east of Karlsruhe, celebrated as the birthplace of Melanchthon. Population, in 1890, about 4000; in 1900, 4800.

BRETTON, HENRY DE. A variant of BRACTON.

BRETTS AND SCOTS, THE LAWS OF THE. The name given, in the Thirteenth Century, to a code of primitive laws in use among the Celtic tribes in Scotland. The 'Scots' were the Celtic people dwelling in the western and more mountainous districts north of the Forth and the Clyde, who, when it became necessary to distinguish them from the Teutonic inhabitants of the low country, received the names of 'the wild Scots,' and, more recently, 'the Scotch Highlanders.' The 'Bretts' were the British or Welsh inhabitants of the region lying south of the Forth and Clyde. This province was for some centuries an independent kingdom, known by the names of 'Cambria,' 'Cumbria,' and 'Strathclyde.' It became, about the middle of the Tenth Century, a tributary principality held of the King of the English by the heir of the King of the Scots. It so continued till after the beginning of the Twelfth Century, when, Cumberland having been incorporated with England, the gradual absorption of the rest of the territory into the dominions of the King of the Scots seems to have been imperceptibly completed.

No more is heard of Cumbria as a principality, but 'the Welsh' continue to be named among its inhabitants, in the charters of the Scotch kings, and they seem to have retained more or less of their ancient Celtic laws until after the beginning of the Fourteenth Century. It was not till the year 1305 that an ordinance of King Edward I. of England, who appeared then to have reduced all Scotland to his subjection, decreed "that the usages of the Scots and the Bretts be abolished, and no more used." It is unknown how far this prohibition took effect. Of the code which it proscribed only a fragment has been preserved. The best edition is that preserved in the *Acts of the Parliaments of Scotland*, Vol. I., pp. 299-301 (Edinburgh, 1844), where the laws are given in three languages—Latin, French, and English. The French version, which is the oldest, is printed from a manuscript of about 1270, now in the register house in Edinburgh. The fragment of the 'laws of the Bretts and the Scots' thus published is of much the same nature as the ancient laws of the Anglo-Saxons, the Welsh, the Irish, and other nations of Western Europe. They are principally concerned with crimes of violence, and contain elaborate provisions for determining the penalty of such crimes, and the terms on which they might be commuted. They fix the *cro*, or price at which every man was valued, according to his degree, from the King down to the churl, and which, if he were slain, was to be paid to his kindred by the homicide or his kindred. The cro of the king was 1000 cows; of the king's son, or of an earl, 150 cows; of an earl's son or of a thane, 100 cows; of a thane's son, 66⅔ cows; of the nephew of a thane, or of an ogthiern, 44 cows and 21⅔ pence; and of a villain or churl, 16 cows—all persons of lower birth than a thane's nephew, or an ogthiern, being accounted villains or churls. A chapter "of blood-drawing"—corresponding with the *blodwyte* of the Anglo-Saxons—fixes the fine to be paid for a blow to the effusion of blood according to the degree of the person wounded and the place of the wound. See BLOOD FEUD; BLOOD-MONEY; BREHON LAWS; WERGILD.

BREUGHEL, bry'kĕl. A family of Dutch painters who derived their name from the town of their birth. PIETER, the father, was born in the village of Breughel, about 1520. He went to Italy to study, but his taste was not elevated beyond the portrayal of rude and vulgar scenes from peasant life. A certain coarse humor pervades his paintings. He died in Brussels in 1569. —His son PIETER the younger, called 'Hellish Breughel,' was born in Brussels in 1564. His work, "Christ Bearing the Cross," is in the Antwerp Museum. He died in Antwerp (1637).—JAN BREUGHEL, brother of Pieter, was born 1568, and died about 1625. He was superior to both father and brother, and was called 'Velvet Breughel,' from the softness and smoothness of his style. He had versatility of talent, and though he painted peasants, and scenes from Scripture, he was chiefly a landscape painter, and as such is repre-

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sented on many a canvas of the figure-painters of his time. In The Hague Gallery is a picture, "Adam and Eve," by Rubens, the landscape of which is the work of Jan Breughel. Good specimens of his work are in the galleries of Dresden, Berlin, Madrid, and the Louvre. In Munich he is represented by a composition representing "a bouquet, around which are buzzing numbers of bees, bugs, and butterflies." Two examples of his works are owned by the Metropolitan Museum of Art, New York. Consult *Schools and Masters of Painting*, A. G. Radcliffe (New York, 1898).

BREUL, broil, KARL HERMANN (1860—). A German-English scholar. He was born in Hanover. He studied from 1878 to 1883 at the universities of Tübingen, Strassburg, and Berlin, and in 1884 was appointed lecturer in German at the University of Cambridge. In 1885 he was also appointed lecturer in German at Girton and Newnham colleges. He has been examiner to the universities of Cambridge and Oxford, to London University, and to the Royal University of Ireland, and in 1897 became sub-editor of the *Modern Quarterly of Languages and Literature*. He is among those who seek to introduce into England the educational methods of Germany. His publications include editions of (1889) Hauff's *Das Bild des Kaisers* (1890); Schiller's *Wilhelm Tell;* and (1899) Goethe's *Iphigenie; a Handy Biographical Guide to the Study of the German Language and Literature* (1895); *Das höhere Schulwesen Grossbritanniens* (1897); and *The Teaching of Modern Foreign Languages in our Secondary Schools* (1898).

BREVE, brēv (It. *breve*, from Lat. *brevis*, short). In general, a short writ, or royal mandate or summons. Specifically, in the practice of the Scotch law, since the institution of the Court of Session (1532), a writ issuing out of chancery in the name of the Crown, to a judge, authorizing and directing him to try by jury the allegations of fact contained in the writ. Formerly these breves—corresponding to the *writs* and *pleas* of English legal procedure—were the foundation of almost all civil actions in Scotland; but with a simplified procedure they have gradually fallen into desuetude. They are retained, however, in a limited number of special proceedings, as in the appointment of a guardian to a minor or a lunatic, in the partition of an inheritance among several heirs, and in proceedings on the part of a widow to recover her dower. See CHANCERY; PLEAS; WRIT.

BREVE (It., from Lat. *brevis*, short). A note in music, found in early ecclesiastical notation, having the value of two whole notes or semi-breves. In the measured strains of the old church music, melodies moved slowly. About the Eleventh Century the two principal notes in use were the longa, ■ and the brevis, ■, the first being twice or three times the length of the second, according to the measure used. So the brevis, or breve, the longest note possible in modern notation, was then considered a 'short' note, as its name implies. At that time all notes were black, or 'filled in.' When, in the Fifteenth Century, white or 'open' notes came into use, the breve was printed ▭ and still later ▭. Either of these later forms is used in the rare instances when it is introduced into modern music. See ALLA BREVE.

BREVET' (OF. *brievet*, Fr. *brevet*, dim. of *bref*, from Lat. *brevis*, short, the commission being a brief writing). A military commission endowing its recipient with a higher rank and title than he would otherwise be entitled to, or than that for which he draws pay. In French usage it applies to commissions in general. In England and the United States it has particular application to a special or higher commission, which is conferred as a mark of distinction, but which does not carry with it any increase in pay. In the United States such officers are addressed officially and otherwise by their brevet rank; but in England such is the case only by courtesy, while officially both titles are used, as, for example, "Major and Brevet Lieutenant-Colonel Smith." Originally the term designated a promotion given on such occasions as a coronation, or the termination of a great war, and had its origin during the reign of James II. (1685-88); but it was abused so frequently and to such an extent, by the general award of brevet commissions, that in 1854, during and after the Crimean War, its bestowal was limited strictly to cases of very distinguished service in the field, and on the principle of seniority. A regimental officer holding a brevet rank only takes the precedence due his rank when in the field; for regimental purposes he ranks according to his regimental seniority. In the United States *brevet* titles were given during the Indian, Civil, and Spanish wars for 'conspicuous gallantry,' 'gallant and meritorious service,' etc. Such officers are recommended to the President, who nominates them and sends the commissions to the Senate for confirmation. Brevet commissions range in rank from first lieutenant to lieutenant-general. In England brevet commissions are confined to not lower than the rank of captain, or higher than lieutenant-colonel.

BRE'VIA'RIUM OF EUTRO'PIUS, THE. A treatise by Eutropius, and his only extant work, narrating in ten short books the events from the founding of Rome to the accession of Valens, A.D. 364, to whom the history is dedicated. The work is abridged from Livy, Suetonius, and late writers. Errors of statement are few and the style is remarkably good for the time of its production. A Greek version, made about A.D. 380, is still extant. *The Breviarium* has been much drawn upon as a basis for other manuals, and many editions have appeared, the most complete critical edition being that of H. Droysen.

BRE'VIARY (Lat. *breviarium*, abridgment, abstract, from *brevis*, brief, short). The service-book, among Roman Catholics, which contains what is called the 'divine office,' or the service for the canonical hours. From very early Christian times, the regular recitation of the Psalms of David formed a large part of the public and private devotion; it was developed in the West by the monks, whose life included frequent meeting for prayer, and still forms the groundwork or nucleus of these offices. Around it grew up a whole system of hymns, prayers, antiphons (q.v.), responses, and readings from Holy Scripture, which forms a very varied and complicated service. Before the Sixteenth Century there was an infinite number of local uses, nearly every diocese having its own breviary. The most ancient and liturgically important of the non-Roman

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breviaries are the Mozarabic once general throughout Spain, and the Ambrosian, traditional in Milan from the days of Saint Ambrose. Pope Pius V. abolished all that could not show an antiquity of two hundred years; and at the present day the Roman breviary is almost universally used, except in the religious orders, which have maintained their own traditional services. It was systematized by Gregory VII. (1073-85), received its practically final form under Pius V. in 1568, with subsequent revision in detail by Clement VIII. (1602) and Urban VIII. (1634), and additions of new offices and feasts by all the later popes. The great number of new saints' days has rendered the ordinary ferial or week-day office very uncommon; and Leo XIII., in 1883, permitted the substitution for it, on days when it would naturally occur, of a 'votive' or voluntary office of a festival character, differing according to the days of the week. This is a tendency in favor of shortening the office, whose recitation, even in private, occupies at least an hour and a half every day. So complicated has the system become that a sort of annual almanac, called *Ordo Recitandi Divini Officii*, is published in many countries, containing minute directions as to what is to be read. The need of simplification led Cardinal Quignon or Quiñones, a Spaniard, to publish a reformed breviary in 1535, which, while it was never widely used, gave the English reformers a number of hints for their simplified and condensed prayer-book (q.v.).

The canonical hours are seven: Matins and lauds (forming practically one service), prime, terce, sext, none, vespers, and compline. Matins was supposed to be, and is in monasteries, sung in the night; the other offices are called the day hours, and are published in separate form, for convenience, under the title *Horæ Diurnæ*. Lauds and vespers are the most important of these services, containing the 'evangelical canticles' (the *Benedictus* at lauds and the *Magnificat* at vespers), and being sung with more ritual solemnity. The names prime, terce, sext, and nones refer to the times at which they were originally recited—the first, third, sixth, and ninth hours of the day. Compline (*completorium*, the completion of the cycle) was recited at bed-time. Those who recite them privately, however, do so at any convenient time, and frequently join two or more offices together. The daily recitation of the breviary is strictly obligatory on all clerics and all 'choir' members of religious orders (as distinguished from lay brothers or sisters). The use of the breviary as a book of private devotion by laymen has become rare since the multiplication of devotional works of different kinds, but at present shows some tendency to increase; and it has always been a common custom to sing vespers or compline, at least on Sundays, in parochial churches.

The contents of the breviary, after the general rubrics, tables, calendar, etc., fall into five parts: (1) The Psalter, or original arrangement of the Psalms and prayers for the days of the week. (2) The Proper of the Season, containing the service for Christmas, Easter, Pentecost, and the seasons dependent on them. (3) The Proper of Saints, for the numerous special feasts which recur on a fixed anniversary. (4) The Common of Saints, parts of the service which belong to classes of saints, as apostles, martyrs, confessors, etc. (5) Several minor services, including the office of the dead and the little office of the Blessed Virgin Mary. The breviary as a whole forms a marvelous storehouse of powerful and tender religious thought; and as by far the largest part of its contents is in the language of Scripture, it is invested with much grandeur and vitality, while the lessons from the fathers and the lives of the saints read at matins contain a mass of scriptural, historical, and theological knowledge. Consult: *The Roman Breviary* (a complete English translation by John, third Marquis of Bute, 2 vols., London, 1879); Batiffol, *Histoire du bréviaire romain* (Paris, 1893); Pleitner *Aelteste Geschichte des Brevier-gebets* (Kempter, 1887); Bäumer, *Geschichte des Breviers* (Freiburg, 1895). For a scholarly modern edition of Quignon's breviary, consult Legg (Cambridge, 1888).

BRE'VIARY OF AL'ARIC (*Breviarium Alaricum*). An important collection of Roman laws, compiled by order of Alaric II., King of the Visigoths, in the first decade of the Sixth Century A.D. It corresponds historically to the code of laws promulgated by Theodoric, King of the Ostrogoths (*Edictum Theodorici*), the Salic Law (*Lex Salica*) and Ripuarian Law (*Lex Ripuaria*) of the Franks, and other similar codes of that period. The primitive conception of law, as of personal and not territorial application, compelled the barbarian invaders to administer two systems of law, one for their barbarian followers, and the other for the Roman inhabitants of the territory occupied by them. The Breviary of Alaric II. was a code designed for the Roman subjects of the invader, and was almost exclusively Roman in character. It was made up of extensive abridgments of the Code and Novels of Theodosius, the Institutes of Gaius, and other recognized authorities. These texts were accompanied by an elaborate commentary, called the *Interpretatio*. A corresponding code promulgated by Alaric for his barbarian subjects, and containing their own native law, was known as the *Forum Judicum* and *Judicum Liber*. This was of the character of other primitive codes, as the Anglo-Saxon laws, the ancient Brehon law of Ireland, etc., though tinctured, more than these, with the influence of Rome. The two codes together constitute the *Lex Visigothorum*. (See CIVIL LAW.) Consult Lee, *Historical Jurisprudence* (New York, 1900). See ALARIC II.

BREVIER. See TYPOGRAPHY.

BREVOORT', JAMES RENWICK (1832—). An American painter, born in Westchester County, N. Y. He studied architecture under Renwick in New York, and paintings under Thomas Cummings. In 1863 he was elected a member of the National Academy, and in 1872 was appointed its professor of perspective. He lived for some time in Italy. His works, chiefly landscapes, include "Lago Maggiore," "November Winds," "Scene in Holland, near Arnheim," "Group of Houses and Boats, Lake of Como," "Castle of Heidelberg—Sunset," "On the Gulf of Salerno," and "A Swiss Scene."

BREW'ER. A city in Penobscot County, Maine, on the Penobscot River, opposite Bangor, with which it is connected by a bridge, and on two branches of the Maine Central Railroad (Map: Maine, F 6). It has lumber, paper, and pulp mills, and shipbuilding yards. Brewer was

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set off from Orrington, and incorporated in 1812, and was chartered as a city in 1889. The government is administered by a mayor, elected annually, and a city council. Population, in 1890, 4193; in 1900, 4835. Consult *History of Penobscot County* (Cleveland, 1882).

BREWER, DAVID JOSIAH (1837—). An American jurist, born at Smyrna, Asia Minor. He graduated at Yale in 1856, at the Albany Law School in 1858, from 1861 to 1862 was a United States Commissioner, and in 1862-65 was judge of the probate and criminal courts of Leavenworth County, Kansas. In 1865-69 he was judge of the District Court of the First Kansas District, and from 1870 to 1884 was a justice of the State Supreme Court. After having served as judge of the Circuit Court of the United States in 1884-89 he was appointed, in 1889, an associate justice of the United States Supreme Court. He was also appointed a member of the Venezuelan Boundary Commission in 1896. While on the State bench he gave an opinion sustaining the Maxwell land-grant, the largest private grant sustained in the United States, and a dissenting opinion on the question of the power of a municipality to issue bonds in assistance of railways. He has taken high rank as a scholarly jurist, and his public addresses have attracted favorable attention.

BREWER, EBENEZER COBHAM (1810-97). An English author and clergyman of the Established Church, born in London. He was educated at Cambridge, and in 1836 was ordained priest. He wrote many educational books, but was known chiefly for his various compendia and reference works, which include *A Guide to Scientific Knowledge* (1850); *A Guide to Scripture History* (1860); *A Guide to Every-Day Knowledge* (1864); *A Dictionary of Phrase and Fable* (1870, 25th ed., 1894); *The Reader's Handbook of Allusions, References, Plots, and Stories* (1880, 12th ed., 1888); and a *Historio Note-Book* (1890).

BREWER, JOHN HYATT (1856—). An American organist and composer, born in Brooklyn, N. Y. He studied under Dudley Buck, was organist of various Brooklyn churches, and in 1881 was appointed organist of the Lafayette Avenue Presbyterian Church. Subsequently he became professor of vocal music in Adelphi College (Brooklyn). His compositions include principally church music, but also secular works for voice, organ, piano, and orchestra.

BREWER, JOHN SMEEREN (1810-79). An English historical writer, born in Norwich. He was educated at Queen's College, Oxford, took deacon's orders in 1837, and in 1839 was appointed lecturer in classical literature at King's College, London. In 1855 he was appointed professor of the English language and literature and lecturer in modern history. For some time he was editor of the *Standard*, but in 1856 began for the Master of the Rolls a series of investigations for the preparation of various works, of which the *Calendar of Letters and Papers, Foreign and Domestic, of the Reign of Henry VIII.* (incomplete, Vols. I.-IV., 1862-72) must be reckoned the most important. His further works in this connection include editions of the *Monumenta Franciscana* (1858), and (1859) of the *Opus Tertius* and *Opus Minus* of Roger Bacon. His *English Studies*, reprinted from the *Quarterly Review*, were edited by Dr. Wace in 1881.

BREWER, THOMAS MAYO (1814-80). An American ornithologist. He was born in Boston, Mass., November 21, 1814, and died there January 23, 1880. He was a physician, newspaper editor, and publisher. In 1839 he edited a new edition of Wilson's *Ornithology*. He wrote most of the biographical sketches in the *History of North American Birds*, by Baird, Brewer, and Ridgway (1874-84).

BREWER, WILLIAM HENRY (1828—). An American agriculturist, born in Poughkeepsie, N. Y. He graduated at Yale (now Sheffield) Scientific School, 1852, and was appointed professor of agriculture there in 1864. He has been closely and influentially identified with the movement for agricultural education and research in the United States for more than half a century. He has been a member of the Connecticut State board of agriculture and president of the State board of health for many years, and became a member of the National Academy of Sciences 1880. He contributed to the *Report on Cereal Production* in the United States Tenth Census (1883), and edited *Botany of California* (1886).

BREWERS' GRAINS. The residue resulting in the manufacture of beer from grain, usually barley, much used as a feed for live stock. In beer-making, the grain is treated with malt to change the starch into sugar, which is then fermented, yielding alcohol. The residue of the grain, which constitutes the brewers' grains, is very wet, containing some 75 per cent. of water. It is sometimes sold in this wet condition for immediate use in the vicinity of the brewery, but spoils rapidly. On account of this and the putrid odor it causes in stables, its use for milch cows is often objected to. There is nothing in fresh, wet brewers' grains which is poisonous or deleterious to milk production, provided they are fed in tight mangers which are kept clean. The partially spoiled grains should not be used for feeding. Brewers' grains are often dried by artificial heat, freeing them very largely of their water, in which condition they keep indefinitely. The average composition of the dried grains is as follows: Water 7.8, ash 3.5, protein, 22.6, fibre, 12.8, nitrogen-free extract 46.8, and fat 6.5 per cent. They are an excellent feeding stuff, especially for cattle and horses, ranking with wheat-bran and oil-meals in palatability and general effects.

BREWERTON, HENRY (1801-79). An American soldier, born in New York City. He graduated in 1819 at the United States Military Academy, was commissioned in the corps of engineers, and rose in that service to the rank of colonel (1864) and brevet brigadier-general (1865). From 1845 to 1852 he was superintendent of the United States Military Academy, from 1852 to 1864 directed the improvements in Baltimore Harbor and at the mouth of the Susquehanna River, and during the Civil War was superintending engineer of the fortifications of Baltimore Harbor and the defenses of Delaware Bay and river. He was among those who contributed to the early extension of the system of coast and frontier defenses.

BREWING (AS. *brēowan*, OHG. *briuwan*, Ger. *brauen*, Icel. *brugga*, to brew; cf. Gk. *βρῦτον*, *bryton*, a kind of beer or cider). The process of making beer, ale, or other fermented liquors which do not undergo distillation. This art,

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which is one of the oldest (see BEER), has been improved from time to time so that at the present day, by the aid of chemistry and bacteriology, the manufacture of beer involves a high degree of technical skill. While it is usual to speak of the manufacture of beer as brewing and the place where it is made as a brewery, yet to be more exact, there are two distinct and separate processes to be considered, the malting and brewing proper.

MALTING. The raw materials for making beer are water, barley, and hops, and the first process in the manufacture is the malting of the barley. The grain is first steeped by placing it in wooden or metal cisterns and covering it with cold water. This process of steeping lasts from 72 to 96 hours, the water being drained off about once a day and replaced by fresh water. During the process of steeping, the barley absorbs a portion of the water which causes it to swell and soften. After being finally drained, the barley is taken from the cisterns and spread to a depth of from one foot to one and a half feet on the malt-house floor. This part of the process is known as 'couching.' In this position the grain begins to germinate or throw out the sprouts, which, if allowed to develop, would form the future rootlets and blades of the barley. This process is one which the maltster watches with the utmost care, since upon its being properly accomplished depends much of the final success of the brew. The chief requisites to be observed are that the germination shall be slow and regular; that it shall not proceed at too high a temperature, and that it shall be checked at the proper time. Different varieties of barley germinate with different speeds, and the maltster has to study the peculiarities of each variety and regulate his work accordingly. This regulation is accomplished by thinning out the couches; by regularly turning the grain over and respreading it; by letting in or shutting out the warmer or the colder outside air, and by resprinkling the grain with water. The thinning down of the couches is technically known as 'flooring.' The duration of the processes of couching and flooring is usually from ten to twelve days. The next step is to check the germination, and this is done by kiln drying. The dry kiln consists of a building with one or more, generally two or three, drying-floors, which is heated to a temperature gradually increasing to the maximum required, which may be from 90° to 100° F. for pale malt, to from 150° to 170° F. for brown malt. For drying the malted grain is spread out on the floors of the dry kiln, and when it is fully dried it is quite crisp. In this condition the grain or malt can be stored for brewing at any time.

BREWING. The first operation in brewing is to crush, or technically to 'bruise,' the malted grain by passing it between iron rollers, the ground product from which is termed 'grist.' The grist is then mixed mechanically with hot water until it has about the consistency of ordinary porridge, and is then run into the malt-tubs, where the temperature is raised to about 170° F. Often the mash-tubs are provided with mechanical mixers for agitating the mixed grist and water which is now called the 'mash.' It is at this point in the process that adulterants are added if they are used. After standing in the mash-tub from two to three hours the liquor is drained off from the bottom, hot water being slowly and evenly run over the top of the mash thoroughly to wash or purge the grist from the liquor, which is now called 'wort.' The wort is allowed to stand for a brief time to clarify, and is then drawn off into copper boilers where it is boiled with hops. From one to four bushels of malt and from one to five pounds of hops are used for a barrel of beer. After being boiled for about two hours in the copper boilers, the wort is drawn off and cooled quickly by passing it through vessels containing coils of pipe in which cold water circulates, or by some other means for rapid cooling, and then run into the vats where fermentation takes place. (See FERMENTATION.) Fermentation is started by adding about one gallon of liquid yeast to one hundred gallons of wort, the yeast used always being some which has been reserved from a previous brewing of the same kind of beer. Fermentation is allowed to progress for from six to eight days. It is comparatively slow at first and then rapidly increases as the wort commences to 'work' until the temperature has risen considerably; large quantities of carbonic-acid gas are thrown off and the surface of the wort is covered with a thick layer of scum. The next process is to run the fermented liquor into other vats, known as cleansing-vats, which are usually provided with some means for cooling their contents, where a mild process of fermentation occurs, which throws off the remnants of the yeast in the shape of scum. The liquor is then drawn off into casks where it is stored, for a greater or less length of time and under different conditions of temperature, to mature. The time required and conditions provided for maturing several of the more common varieties of beer are different in their precise natures and are discussed under BEER.

TECHNOLOGY AND CHEMISTRY. The two preceding paragraphs outline briefly the processes of malting and brewing. To describe the technology and chemistry of these processes in non-technical language is rather difficult. Briefly enumerated, the technical considerations which call for the most particular attention are: (1) The nature and quality of the grain used; (2) the malting of the grain; (3) the temperature at the commencement of mashing and again at the beginning of fermentation; and (4) the quality of the water used. It is impossible to enter into these technical questions in detail here, but some brief indications of their character may be given. Regarding the choice of barleys for brewing, they should be thoroughly ripened and should be carefully harvested and handled to preserve the skin or husk of the kernel, since when the kernel is bruised or has its skin broken mold is likely to attack it and cause trouble, if not disaster, in malting and brewing. The precautions to be taken in malting have already been described. Regarding the incipient temperature of the mash and of the wort at the commencement of fermentation, it can only be said here that it is held to be of prime importance, and if not accurately controlled may result in spoiling the brew. In respect to the water used, the principal requirements are that it should be absolutely pure and should be somewhat 'hard,' that is, it should contain lime salts. The principal chemical actions occur during malting, when the mash is being made, and during fermentation. During malting the albuminous substances in the grain

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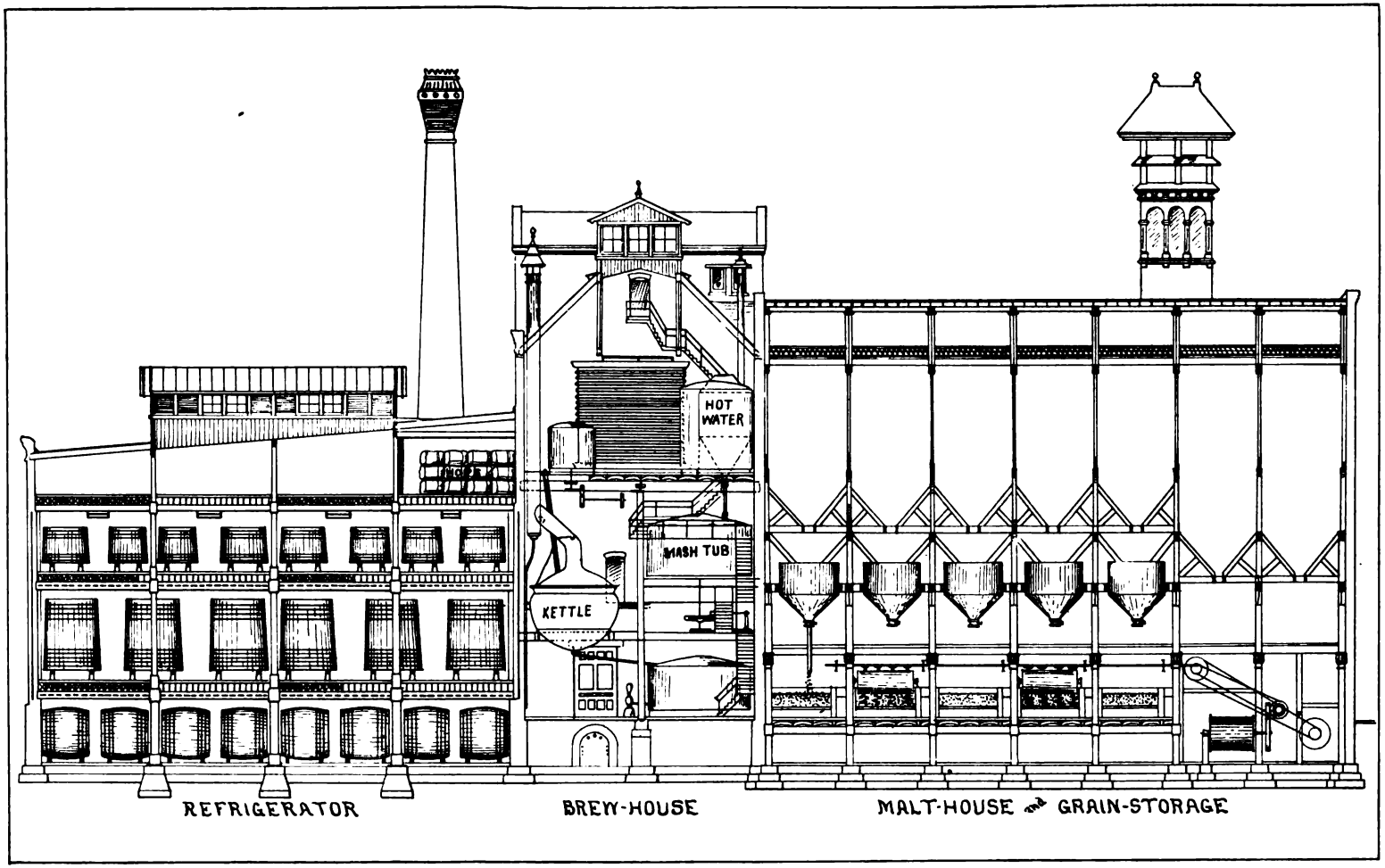

CROSS SECTION OF MODERN BREWING PLANT.

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are changed to a substance known as diastase, which has the power to change the insoluble starch of the grain into dextrin, and then into glucose or grape-sugar, both of which substances are soluble in water. This conversion takes place during the steeping of the mash. During fermentation the glucose which has been formed in steeping is decomposed by the action of the yeast into alcohol and carbonic-acid gas. Various minor chemical reactions occur during all of these processes, for the explanation of which special treatises on brewing and fermentation may be studied.

ADULTERATION. Broadly defined, adulteration may be said to be the use of any substitute, whether wholesome or injurious, in place of the barley, malt, or the hops. In England, the admittedly wholesome adulterants for malt usually consist of a preparation of raw grain, or what are known as brewing-sugars. A popular manufactured substitute for malt is 'Dextrin Maltose,' which is made from raw starch treated with dilute acid until the relative proportions of the two substances, dextrin and maltose, are similar to those of normal malt wort. Among the injurious adulterants are wormwood, aloes, picric acid, and strychnine. These are rarely, if ever, employed abroad, and probably very much less than is generally assumed in the United States. It is a common practice in America, however, for beer to be sold before the final curing in the casks is accomplished, and to produce the 'life' or appearance which this final fermentation brings about, capsules of sodium bicarbonate are introduced into the casks.

BREWSTER, BENJAMIN HARRIS (1816-88). An American lawyer. He was born in New Jersey, graduated at Princeton in 1834, and was admitted to the bar of Philadelphia in 1838. He was appointed Attorney-General of Pennsylvania in 1867, and during his term of office succeeded in breaking up the notorious 'Gettysburg Lottery' scheme. From 1881 to 1885 he was Attorney-General of the United States, in President Arthur's Cabinet, and in this capacity conducted the 'Star Route' trials with great energy and ability.

BREWSTER, CHAUNCEY BUNCE (1848—). An American Protestant Episcopal bishop. He was born at Windham, Conn., and was educated at Yale University and at Trinity College, Hartford. After occupying rectorates at Rye, N. Y. (1873-81), Detroit (1881-85), Baltimore (1885-88), and Brooklyn (1888-97), he was in 1899 appointed Bishop of Connecticut. The following are his principal publications: *The Key of Life*, a series of Good Friday addresses (1894); *Aspects of Revelation* (1901).

BREWSTER, Sir DAVID (1781-1868). An eminent Scotch physicist, born at Jedburgh. He was educated for the Church of Scotland at the University of Edinburgh, and was licensed to preach by the presbytery of Edinburgh. Instead of following the life of a clergyman, he devoted himself to scientific study and research and literature, and in 1808 he became the editor of the *Edinburgh Encyclopædia*, to which he contributed many important scientific articles. Previous to this he had entered deeply on the study of optics, with which his name is now enduringly associated. The optical toy called the kaleidoscope was invented by him in 1816, and he published a treatise on the instrument three years later. The stereoscope is also largely his invention, the honor being shared with Wheatstone, though the divided lenses and their arrangement are due entirely to Brewster. In 1817, in conjunction with Professor Jameson, he edited the *Edinburgh Philosophical Journal*, the name of which, in 1819, was changed to the *Edinburgh Journal of Science*, and in 1831 he was one of the founders of the British Association for the Advancement of Science. Brewster's scientific work brought to him many honors. In 1815 he obtained the Copley Medal of the Royal Society for one of his optical discoveries, and soon after was elected a fellow. In 1816 he received half of the physical prize bestowed by the French Institute for two of the most important scientific discoveries made in Europe during the two preceding years. In 1819 the Royal Society awarded him the Rumford gold and silver medals for his discovery connected with the polarization of light. In 1825 he became corresponding member of the Institute of France. In 1831 he was knighted and had a pension conferred upon him. In 1838 he was chosen principal of the united colleges of Saint Leonard and Saint Salvador, Saint Andrews. In 1849, on the death of Berzelius in the preceding year, he was elected one of the eight foreign associates of the French Institute, the highest scientific distinction in Europe. Brewster was also a member of the Imperial and Royal academies of Saint Petersburg, Berlin, Copenhagen, and Stockholm, and a foreign associate of the National Academy of Sciences of the United States. He presided over the British Association, and in 1851 over the Peace Congress held in London. In 1859 he was chosen vice-chancellor of the University of Edinburgh. His principal work is his *Life of Newton*, first published in 1828, and issued in a totally new and greatly enlarged form in 1855. Among his other works are his interesting *Letters on Natural Magic*, addressed to Sir Walter Scott; *More Worlds Than One* (1854); his treatises on the kaleidoscope and on optics (*Cabinet Cyclopædia*); his *Martyrs of Science;* and his treatises in the *Encyclopædia Britannica* on electricity, magnetism, optics, the stereoscope, etc. Among the periodicals to which he contributed largely are the *Edinburgh* and *North British Reviews*. Consult Gordon, *Home Life of Brewster* (Edinburgh, 1869).

BREWSTER, FREDERICK CARROLL (1825-98). An American lawyer, born in Philadelphia, Pa. He graduated at the University of Pennsylvania, was admitted to the bar in 1844, and from 1862 to 1866 was city solicitor. In 1866 he became judge of the Court of Common Pleas, and in 1869 State Attorney-General. He was instrumental in obtaining for the city of Philadelphia the Stephen Girard bequest and the Schuylkill River Bridge. His publications include a *Digest of Pennsylvania Cases* (1869); *Brewster's Reports* (4 vols., 1869-73); and *Practice in Pennsylvania Courts* (1888).

BREWSTER, WILLIAM (c.1560-c.1644). A leader of the 'Pilgrims,' generally known as Elder Brewster, who came to America in the *Mayflower* in 1620. He was born at Scrooby, Nottinghamshire, studied for a time at Cambridge, and from 1584 to 1587 was in the service of William Davison, then Ambassador to the Low

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Countries and afterwards the Secretary of State of Queen Elizabeth, who, says Bradford, regarded him as "so discreet and faithful that she trusted him above all others who were with him." About 1587 Brewster retired to Scrooby, "to live in the country in good esteeme amongst his freinds and the good gentlemen of those parts, espetially the godly and religious." Here he occupied the old Scrooby manor house, and for some years held the position of 'post,' which was then frequently filled by men of high social standing, and which involved the entertainment of travelers, as well as the dispatch of the mails and the supplying of relays of horses. He was in thorough sympathy with the Separatists at Scrooby, who on each Sunday assembled for worship at the manor house. In 1608 he was one of the company of Non-Conformists who, to avoid persecution, removed to Holland; and at Leyden, his fortune having been exhausted, supported himself by teaching English to the students at the university, and by publishing books whose circulation was prohibited by the English Government. With Bradford, Carver, and Winslow, he urged the migration to America, and with Bradford he went to England in 1619 and secured a patent for a tract of land in America. In the following year he crossed the Atlantic, with the first company of 'Pilgrims,' and for the next twenty-four years was one of the leaders at Plymouth, where he did much by his energy and cheerful optimism to make the colonizing experiment a success. Having been the ruling elder of the congregation in Scrooby, Amsterdam, and Leyden, he continued to act as such at Plymouth, and until 1629 was also a teacher and preacher, holding services twice each Lord's Day, though he always refused to administer the sacrament. At his death he left a library of 300 volumes, a catalogue of which has been preserved. Bradford prepared an interesting *Memoir of Elder Brewster*, which may be found in Young's *Chronicles of the Pilgrims* (Boston, 1841), and in Vol. III., 5th series, of the *Collections of the Massachusetts Historical Society*. Consult Steele, *Chief of the Pilgrims; or the Life and Times of William Brewster* (Philadelphia, 1857).

BREWSTER'S LAW. See LIGHT.

BREWTON, brōō't'n. A town and county-seat of Escambia County, Ala., 100 miles south by west of the State capital, Montgomery, on the Louisville and Nashville Railroad (Map: Alabama, B 4). It has truck-farming interests, and various manufactures of lumber and wooden products. Population, in 1890, 1115; in 1900, 1382.

BREYMANN, brī'mán, HERMANN (1843—). A German philologist. He was born at Oker, near Harzburg, and studied philology at the universities of Göttingen, Bonn, Marburg, and Paris. In 1875 he was appointed professor of the French and English languages at the University of Munich. He is one of the foremost authorities on pedagogical questions affecting instruction in modern languages. In addition to the *Münchener Beiträge zur romanischen und englischen Philologie*, of which he is the editor, Breymann has published the following important works: *Les deux livres des Macchabées* (1868); *Marlowe's Dr. Faustus* (1889); *Bearing of the Study of Modern Languages on Education at Large* (1872); *Diez, sein Leben, seine Werke; On Provençal Literature* (1875); *Die neusprachliche Reform-Litteratur 1876-93* (1895).

BRIALMONT, brē'ăl'mŏn', ALEXIS HENRI (1821—). A Belgian engineer and military writer. He has published a large number of works on the art and methods of military fortification, and is regarded as an authority on this subject. He designed the principal fortifications of Antwerp, the fortifications of Bucharest (1883), and those of Liège and Namur, in 1887. Among his publications are *Précis d'art militaire* (4 vols., 1850), and *La fortification du temps présent* (2 vols., 1885).

BRIANA, brī-ā'nâ. In Spenser's *Faerie Queene*, the owner of a great castle. She obtains Crudor's love by making him a mantle of 'beards of knights and locks of ladies,' and allows no one to pass her stronghold without being shorn.

BRI'AN BOROIMHE, bō-roim', or **BORU**, bō-rōō' (926-1014). A famous King of Ireland. He became King of Cashel, comprising the present countries of Tipperary and Clare, in 987. In 1001, after defeating Maelsechlainn, he was acknowledged the chief King of Ireland. The surname Boroimhe, signifying tax, was given him in consequence of the tribute in kind he levied from the various provinces. He lived in the Dun of Cenn Coradh, in a state of rude plenty. He is said to have defeated the Danes in twenty-five pitched battles. In the battle of Clontarf, April 23, 1014, in which he was killed, Brian gained a signal victory over a united army of revolted natives and Danes, the power of the latter receiving a shock from which it never recovered. Brian Boru is the great hero of the Irish, but fact and fiction have become so mingled in the accounts of his life that it is difficult to form an accurate picture of the real warrior chieftain.

BRIANCHON, brē'ăn'shŏn', CHARLES JULIEN (1785-1865). A French mathematician, born in Sèvres. He studied at the Ecole Polytechnique, in 1808 was appointed lieutenant of artillery, in 1815 assistant director of the manufacture of arms, and in 1818 a professor at the Ecole d'Artillerie. His publications include *Application de la théorie des transversales* (1818) and *Essai chimique sur les réactions foudroyantes* (1825). He is best known for a theorem which appeared in 1806 in the *Journal de l'Ecole Polytechnique*, in an article later expanded into *Mémoires sur les lignes du second ordre* (1817). One form of the statement of the theorem is: The three diagonals of every hexagon circumscribed to a conic meet in a point. See GEOMETRY, MODERN.

BRIANCHON'S THEOREM. See BRIANCHON, CHARLES JULIEN.

BRIANÇON, brē'ăn'sŏn' (anciently, Lat. *Brigantium*, 'the town on the heights,' from Celt. *braigh, brig*, heap, pile, elevation). A strongly fortified town in the Department of the Hautes-Alpes, France, situated at the confluence of the Durance and Guisane, about 35 miles northeast of Gap (Map: France, N 7). It is the highest town in France, being more than 4300 feet above sea-level. It is a fortress of the first class, commands the entrance into Italy by Mont Genèvre and the principal passes, and is the principal military depot and arsenal in the French Alps.

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Briançon has manufactures of silk, cotton, hosiery, and cutlery. Population, in 1896, 7177. In Roman times the town was called Brigantium, and lay on the direct route from Italy to Embrun and Gap. It was not fortified by the French until 1722, and the building of its ten forts has gone on from that date until to-day.

BRIANSK, bryänsk, or **BRYANSK** (Russ., earlier *Debryansk*, Slav. *Dibryansk*, from *debri*, thicket, forest, for which the neighborhood was quite famous). A district town in the Russian Government of Orel, situated on the right bank of the navigable Desna, about 80 miles northwest of Orel (Map: Russia, D 4). It is divided into several parts by a number of short streams, and contains a large number of churches, among which the Pokrov Cathedral is the most prominent. In the vicinity of the town is situated the monastery of Svensk-Uspensk, dating from the Thirteenth Century and containing a theological seminary. The settlement around the monastery is the place of an important annual fair. Owing to its advantageous position on the Desna, Briansk has a considerable trade in hemp, timber, ropes, grain, and salt. The chief manufacturing establishments are iron-foundries and glass-works. There is also an important arsenal. Population, in 1888, 20,200; in 1897, 23,520.

BRIAREUS, brī-ā'rē-ŭs (Gk. Βριάρεως, *Briareōs*), or ÆGÆON. One of the three sons of Uranus and Gæa. The others were Cottus and Gyes, and each of the three had a hundred arms and fifty heads. They assisted Zeus when the Titans made war against Olympus. In Homer Briareus appears alone as a friend of Thetis, and ally of Zeus during a revolt of the gods. In this account he is represented as dwelling in the depths of the sea.

BRIBERY (OF. *briberie*, from OF. *bribe*, bit of bread given to a beggar, from Breton *breva*, to break). The offering, promising, giving, or receiving of money, goods, employment, or personal advantage of any kind with a view to unlawfully influence the receiver in the exercise of a public duty. Such public duties are those of judges, legislators, executive officers of government or state, voters in the exercise of suffrage, customs officers, and others. A contract founded on such a consideration is totally void, as being immoral and contrary to public policy. The person giving, as well as the one receiving, the bribe is guilty of the crime of bribery. The United States and the several States in their statutes define the offense as applied to courts, officers, and voters within their jurisdiction, and they impose severe penalties of fine or imprisonment, or both, for conviction of bribery.

Judicial bribery is defined by Greenleaf as the "receiving or offering any undue reward by or to any person whose ordinary profession or business relates to the administration of public justice, in order to influence his behavior in office and incline him to act contrary to the rules of honesty and integrity." It is a matter of congratulation that the higher courts of this country have been almost uniformly free from the taint of suspicion of bribery. The United States Supreme Court has a spotless record in this respect, as have most of the higher courts of the several States. The offense has been rare, also, in the history of the administration of justice in England. It was punishable at common law. Perhaps the earliest reported case of judicial bribery is that of Sir William Thorpe, in 1351. This was followed by the impeachment of Chancellor Michael de la Pole in 1384. But the most celebrated case of judicial bribery in England is that of Lord Bacon, who pleaded guilty to corruption in office, and who was sentenced to pay a fine of £40,000, imprisonment during the King's pleasure, incapacity for office, and exclusion from Parliament.

The corruption of other public officials was also a common-law offense, whether the bribery was employed to induce the officer to act or to refrain from acting in his official capacity. The mere offer of a bribe, though it was refused, constituted a common-law misdemeanor. The bribery of jurors is considered under embracery (q.v.).

The form of bribery which is most dangerous at present, as well as the one which has called forth the greatest amount of legislation, is that which aims at the corruption of voters at public elections. Modern statutes upon this subject are dealt with under ballot (q.v.) and corrupt practices (q.v.). An announcement by a candidate for office that, if elected, he will serve at a less salary than that provided by law has been held to be an offer of a bribe to the voters. Consult the authorities referred to under BALLOT; ELECTIONS; CORRUPT PRACTICES; EMBRACERY; and CRIMINAL LAW.

BRIC-À-BRAC (Fr., possibly from OF. *de bric et de broc*, by hook or by crook, or it may be a reduplication with change of vowel, like rick-rack, riff-raff, etc.). A word of uncertain origin denoting objects of many kinds used for decorative purposes, such as old furniture, *objets de vertu*, or ornaments interesting because of rarity, or merely because they are quaint or obsolete. The term usually designates small objects, and differs from *curio* in that its connotation extends only to articles that have some claim to æsthetic merit. Indiscriminate collections of such objects were formerly very popular, but have largely gone out of fashion except in a small way. Bric-à-brac is often of archæological, and even of ethnological, interest, but the taste sometimes degenerates into a 'fad,' and often results in overloading spaces in dwellings. When systematic or historic collections are made on a large scale, as of musical instruments, snuff-boxes, fans, etc., they may be extremely useful as preserving for future generations the minor notes of many of the fast vanishing modes of life, manners, and practices of the past which can be traced and revived through their study.

BRICE, CALVIN STEWART (1845-98). An American lawyer and politician. He was born in Ohio and served in the Union Army from 1862 to 1865. He graduated at Miami University in 1863, practiced law for a short time, but soon turned his attention to railroad affairs, and was identified with the East Tennessee, the Richmond Terminal, the Duluth, South Shore and Atlantic, and several other roads. At the time of his death he was interested in the American China Development Company, the purpose of which was to build a road from Hankow to Canton, and thence to Hong Kong. In politics a Democrat, he was an elector on the Tilden (1876) and Cleveland (1884) tickets; was chairman of the Democratic National Campaign Committee in 1889,

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and in 1890 became a member of the United States Senate.

BRICK (probably allied to *break*, originally meaning a fragment; cf. Fr. *brique*, a piece, fragment). The earliest examples of this branch of the ceramic art were doubtless the sun-dried bricks of Egypt, Assyria, and Babylonia. Remarkable to say, many of these, which, in a northern climate, the frosts of a single winter would destroy, have been preserved for 3000 years or more by the dry, warm atmosphere of those countries. Sun-baked bricks of ancient date are also found in the mud walls of old towns in India. Kiln-baked bricks must have been the products of a later time; but they are found in all the chief ruins of ancient Babylonia, where they were often used to face or bind together walls of sun-dried bricks, and occasionally they were even ornamented with enameled colors. These ancient bricks, whether baked by the sun or by fire, were all made of clay mixed with grass or straw. The ancient Greeks, probably owing to their possessing plenty of stone, cared little for building with burned clay; but most of the great ruins in Rome were originally built of brick, and the Romans appear to have introduced the art into England. Interesting historical information has been obtained from the impressions on Roman and especially on Babylonian bricks. In many instances the Roman bricks found in England have been removed from their original position, and employed in the construction of buildings of later date. The earliest instance in which bricks of the modern or Flemish make occur in England is Little Wenham Hall, in Suffolk (1260). In America bricks were made in Virginia as early as 1612; in New England, in 1647, and in Philadelphia, in 1685. The hand-power brick-machine was invented in 1835 by Nathaniel Adams, of Cornwall, N. Y. A little later he designed a brick-machine operated by horse-power, and he also invented a tempering wheel for working clay.

Common Building Brick may be made of any clay that can be molded well and then burned to a hard, uniform texture and red color. Good bricks do not absorb more than 10 per cent. of water. The standard size of brick in the United States, as adopted by the National Brick Manufacturers' Association in 1887 and the National Trades' Association in 1889, is 8¼ × 4 × 2½ inches. The legal standard in England is 8¾ × 4⅜ × 2¾ inches. The sizes in Scotland, Germany, Austria, and South American countries increase in the order named, and in the case of the latter bricks are as large as 12¾ × 6¼ × 2½ inches. They are classed as arch, red, or salmon, according to whether they come from the centre, inner, or outer portions of the kiln. The first are inclined to be hard or brittle, and the last to be too soft.

Front Brick, also known as pressed, repressed, Philadelphia pressed, or face brick, is a smooth, sharp-edged brick, first-class in color, used for the front or other exposed surface of buildings where good effect is particularly desired. Originally they were always molded by hand, and then pressed, hence the name. After machine molding was adopted, the term repressing naturally came into use. At present a very good front brick can be made in a machine in one operation, but repressing is still practiced for front brick, either after hand or machine molding. The clay should be selected carefully, and may be weathered, or exposed to the action of the atmosphere for a long time, or two clays may be mixed. Front bricks are now made in a variety of colors, instead of in red alone. The standard size adopted by the two associations named above is 8⅜ × 4 × 2¼ inches.

Enameled or Glazed Brick is a self-explanatory term. See Enamel.

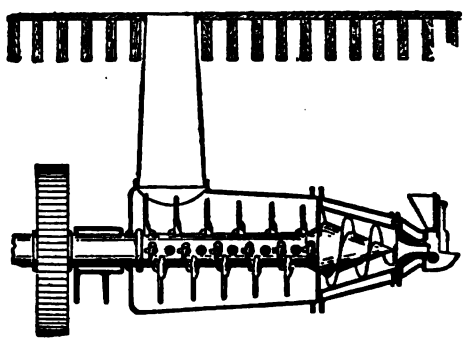
Ornamental and Special Forms may be made in various architectural shapes, as for moldings, or for the voussoirs of arches, and are sometimes machine molded. When built up laboriously by hand, they may be classed as terra-cotta. They require better clay and more careful manipulation than front brick.

Fire-Brick is made from refractory clays, which should contain not over 4 per cent. of impurities. Plastic and flint clays are commonly mixed in equal parts, the former adding toughness and the latter the refractory quality. Weathering is generally advisable. The process of manufacture is much the same as for ordinary brick. High-grade fire-bricks are made at Stourbridge, England, at various places in New Jersey, and elsewhere in the United States. As their name implies, they are used where intense heat must be withstood, as in the case of furnace or chimney linings. *Bauxite* and *silica brick* are also used as fire-brick, but are not clay products. Bauxite (q.v.) took its name from Baux, France, but is now found in the United States.

Paving-Bricks are coming into use in the United States with great rapidity. Clay for paving-brick should stand vitrification, or, more properly, semi-vitrification, without losing its shape; but it need not be a fire-clay. Shale is much used for the purpose. Paving-bricks are often repressed. The finished product should be tough, stand abrasion and impact, and be quite non-absorbent.

Sewer-Brick are ordinary brick, selected for hardness, regular shape, and smooth surface.

Brick-Manufacture. After the clay is properly worked it must be molded, dried, and burned.



TEMPERING DEVICE AND AUGER OF BRICK-MACHINE.

(Working is treated under Clay-Working, and burning under Kilns.) Molding was formerly done by hand, and this method is still followed at small yards, or for the manufacture of special brick; but machine molding is becoming more and more common. Molding-machines are of the soft-mud, stiff-mud or wire-cut, and dry-clay types. Soft-mud machines are generally used by the smaller makers. Their characteristic features are an upright receptacle of wood or

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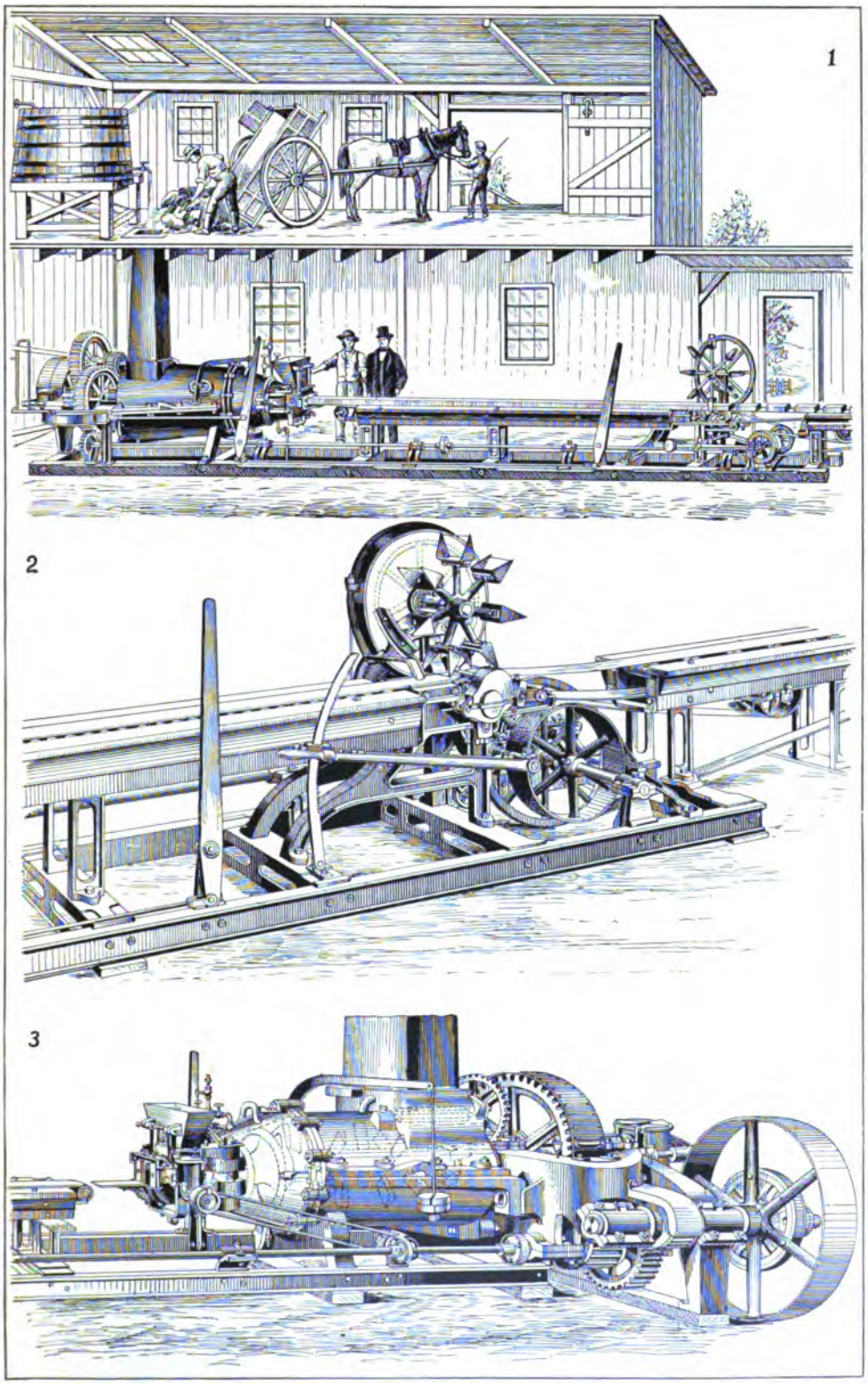
BRICK-MAKING MACHINERY



1. END-CUT BRICK MACHINE IN OPERATION. 2. AUTOMATIC WIRE CUTTER FOR END-CUT BRICKS.
3. LARGE AUGER MACHINE.

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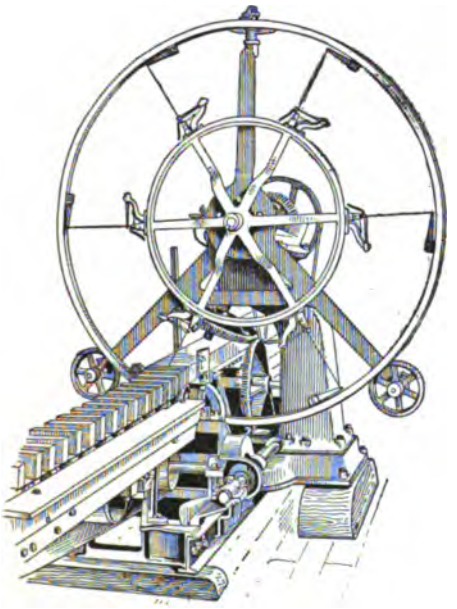
iron, containing a knife-bearing, revolving central shaft, with curved arms at the bottom to force the clay into the press-box. The molds are sanded, then fed in automatically beneath the press-box. After the molds are filled under pressure they are moved forward to a delivery table. Stiff-mud machines, as the name implies, treat stiffly tempered clay, which is forced through a die by either a plunger or an auger. The plunger gives bars of clay, of fixed lengths, and the auger a continuous bar or stream, but in either case the bars may be cut into brick by means of parallel wires; or in the case of the auger machines automatic cutters may be used, and the process made continuous, thus increasing the capacity, and also requiring less power. The auger machines may cut the brick either end-



SIDE-CUTTING MACHINE.

wise or sidewise, the machines and product being known, accordingly, as end-cut or side-cut. The plunger machines are end-cut. The auger machines tend to give the brick a laminated structure, which is objectionable. Some molding-machines combine a vertical pug-mill (see CLAY MINING AND WORKING, paragraph *Pug-Mills*), with a revolving arm which forces the clay down into molds ranged around the edge of a horizontal revolving table. Plungers from both above and below compress the clay. Dry-clay machines use a pulverized, screened clay, which is fed from a hopper through canvas tubes or chargers into molds, where the clay is pressed from above and below, somewhat as just described. Brick thus made are very dense, but their particles are not well united. These machines are used chiefly to make front brick. After the bricks are turned out by the machines it is necessary to dry them before burning. This is done in the open air, in covered sheds, or in heated tunnels, from which they are taken to the kilns. For a description of burning see KILNS, and for accounts of the brick industry, both in general and in detail, consult: The several annual issues of *The Mineral Industry* (New York, 1892-1900); Wheeler, *Vitrified Paving Brick* (Indianapolis, 1895); Davis, *Practical Treatise on the Manufacture of Bricks, Tiles, and Terra-Cotta* (London, 1884).

ARCHÆOLOGY OF BRICK. Throughout antiquity two kinds of brick were used, the crude or *sun-dried* and the *kiln-dried* or fired bricks. Brick-making was invented in Babylonia, where nature had provided no other building material, there being no quarries or forests; and if, as is asserted by eminent authorities, the earliest civilization was formed in Babylonia, bricks may be deemed the earliest material used in permanent construction, as well as the basis for the invention of the arch, dome, tunnel, and other methods of vaulting. Buildings made of bricks have been discovered dating long before B.C. 4000. The same processes were followed in Egypt, where, however, the use of brick was not nearly so general, as stone-quarries were abundant. Assyria followed Babylonia far more closely, using stone hardly at all, except occasionally for foundations and facings. In the preparation of crude bricks, the clay was first freed of grit, stones, and lumps, then mixed with finely chopped straw, then a fixed proportion of water was added, and finally the mass was kneaded with the feet in shallow basins. This material was then thrown into molds varying in size from 14 to 15½ inches square, and from 2 to 4 inches thick. The Babylonians allowed the bricks to dry thoroughly before use, but the Assyrians were satisfied with brief and imperfect desiccation; for usually it is possible to detect separate courses and even separate bricks in Babylonian ruins, but in the Assyrian walls all individuality has been lost through the adhesion of moist surfaces.

The kiln-dried bricks were used in much smaller quantities, for facing the masses of crude brick so as to preserve them from disintegration, especially by water, and for thin and inner walls. These bricks were burned by wood fires in ovens or flare kilns. They also were commonly square, somewhat smaller than the crude brick, about a foot in length and breadth. Usually, one of their flat sides was stamped with the name and titles of the reigning king, and this side was laid downward. These bricks have been the best means of fixing the dates of many temples and palaces in Babylonia and Assyria. Besides the regular-sized burned bricks, others were molded in special shapes and sizes: segments of circles for use in columns; wedge-shaped, for use in arches; triangular, for corners; even convex. Undoubtedly, the Babylonians deserve the palm for both quality and variety. The bricks were laid in liquid clay, lime mortar, or bitumen. According to Herodotus, in building the walls of Babylon the clay from the trenches was used for making the bricks, which were then laid in "hot asphalt for cement, and between every thirtieth course of bricks placing mats of woven reeds." (Cf. Genesis xi. 3, for the building of the Tower of Babel.) A third form of brick used by Babylonians and Assyrians was the enameled brick, in which the body of the brick was only lightly fired so that the enamel could better penetrate.

We do not associate bricks with the Greeks, yet it is certain that among them crude bricks were in general use, especially in the earliest times. At Troy, Tiryns, and other cities of the Mycenæan Age, such bricks formed the constructive

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material of houses and palaces, together with wood. In fact, this seems to have been the case with the Hittites and other early Mediterranean peoples. For this reason only the stone foundations remain of most structures, as crude bricks, when used for thin walls, cannot last. When in historic times the Greeks had in general substituted stone for wood, crude brick, and terra-cotta in their public buildings, they still often used crude brick for city walls, because, as Pausanias says, it is "safer against the shock of military engines than either burnt brick or stone." Against such brick ramparts streams of water were used, as in the siege of Mantinea by the Spartans, when a river was turned into the trenches. There were two sizes: 14½ inches square for public buildings; 11½ inches square for private buildings; and half bricks, to be used in alternate courses. Burned bricks appear hardly to have been used at all by the Greeks until after the Roman conquest. The Greeks called crude bricks *plinthoi omai*, and fired bricks *plinthoi optai;* the Roman names were *lateres crudi* and *lateres cocti* or *coctiles*.

The Romans began by using crude bricks almost exclusively. Vitruvius, Pliny, Columella, Varro, and other Latin authors give interesting details as to their manufacture. An especially choice kind was made in parts of Spain and Asia Minor, so light that they would float in water. They also resisted dampness. It was considered advisable to let bricks dry for two years before use; but the laws of Utica required five years. The best period for manufacture was said to be May, because summer bricks dry so quickly on the surface that they retain an internal dampness which causes cracks. The Roman brick was smaller than any hitherto made, and the square form was for the first time abandoned. The norm was 12 × 6 inches. When the Empire began, under Augustus, the Romans had largely substituted fired for crude brick in both private and public buildings; and the adoption of concrete for heavy walls, faced with fired bricks, in place of the earlier stone walls, gave permanent prominence to this kind of brick in construction throughout the civilized world. The modern Italian bricks have preserved many qualities of the old Roman ones, which were substantially tiles, beaten flat and dried on the ground, then stacked edgewise in the furnaces on cross-pieces or on the floor itself. Roman brick-furnaces have been found on sites in Italy, Gaul, Germany, England, etc. In laying them, the mortar bed was prepared first, and the brick laid with both hands. The Romans not only brought back the Babylonian popularity of brick, but also revived Babylonian methods. They added an inscription to their molds, bearing the name of the reigning Emperor, magistrate, contractor, or manufacturer, of great value in identifying and dating buildings. They also used a variety of shapes to suit all purposes and constructive forms. Such bricks verge on *terra-cotta* (q.v.), under which head the combination of plastic earthenware with brickwork will be described. A geographical survey will show that brick did not become equally popular in all parts of the Roman Empire. For instance, in Syria, in North Africa, in the south of France, and in Asia Minor, the Greek tradition of stone construction was maintained nearly intact. When Christian architecture arose, the solid Roman concrete construction was abandoned, and brickwork became even more prevalent; though stone was still used in the regions just named, except that brick, being adopted at once by Byzantine architecture, drove stone out of most Hellenic lands by the Seventh Century. But the universal decadence affected even brickmaking. All the basilical churches being of brick (except in Syria, etc.), it is easy to compare their quality in different centuries. Often the bricks were drowned in mortar, especially in Gaul. Really good brickwork does not return until the Twelfth Century in the West. But meanwhile the good traditions had been maintained in the East, not only by the Byzantines, but by the Mohammedans of Persia, Syria, Egypt, etc. The Byzantines soon sought to vary the plain brick exteriors by making a facing of alternate courses of stone or marble and bricks, and by laying the bricks so as to form panels and patterns. Churches thus constructed begin to be numerous in the Ninth and Tenth centuries (e.g. Ch. Theotocos, Constantinople; Ch. Apostles, Saints Bardias and Elias, Salonica; Mistra churches). It was Byzantine art which invented decorative brickwork, for that of the Romans was always perfectly plain. Hence it passed into the Romanesque art of Italy in the Eleventh Century, through such monuments as Santa Fosca, at Torcello, and San Donato, at Murano. Then arose the one really decorative school of brick architecture in two main branches, the earlier and finer in northern Italy, the second in northern Germany. It is true that there is considerable good brickwork in the south of France. Its largest monument, Saint Ternin, at Toulouse, is partly of brick, and the convent of the Jacobins, at Toulouse, is a most artistic brick structure; and wall patterns were sometimes obtained here by bricks of different colors, or a mixture of stone and brick, especially during the Renaissance. But Italy remained preëminently the home of brick construction, and the Lombard school solved the problem of combining it with details in marble and terra-cotta, as well as by inventing a wonderful variety of molded bricks. Its results still serve as models. Mr. Street's book, *Brick and Marble Architecture of the Middle Ages in Northern Italy* (London, 1855), came as a revelation of possibilities. Pavia, Bologna, Cremona, Milan, Bergamo, Brescia, Verona, Vicenza, and many more cities are full of churches and town halls built entirely in this style, between the Eleventh and the Sixteenth centuries. The style reached its culmination in the Gothic period of the Thirteenth and Fourteenth centuries. The different materials were variously combined. In the Merchants' Exchange at Bologna, the shafts, tracery, and balcony are of marble, the capitals and archivolts of terra-cotta, and the rest of brick; but in many cases most of the detail is obtained purely by pressed bricks. One of the charms in many cases lies in the uneven sizes and shapes of the bricks made by hand. Of course, brickwork was used also in Tuscany, Umbria, the Roman States, and in other regions, but not as generally or effectively. Spain also used it largely in the region between Saragossa and Toledo, and so did Flanders. But it was in northern Germany, especially in Brandenburg and Pomerania, that a second original note was struck, throughout the Middle Ages and the Renaissance, in such cities as Lübeck, Hamburg, Brandenburg, Stralsund, Jerichow, Bres-

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lau, etc. The great gate-towers are imposing; the churches and houses are characterized by gables—often stepped—of enormous size and a single pitch. There is less variety and richness of detail than in Italy, less combination with marble and terra-cotta. For mention of individual buildings, see the historical article on ARCHITECTURE.

We have so inherited from the Middle Ages the use of stone for architecture with any pretension to style, that it is only recently that our architects have begun to realize the possibilities of brickwork and to study the great works in northern Italy.

BRICK, JEFFERSON. A caricature of an American type, in Dickens's *Martin Chuzzlewit*. He is among Martin's chance acquaintances during that gentleman's short trip to the New World. He is a mild-mannered youth, but possessed of singularly strenuous political views, and is introduced as war correspondent for the New York *Rowdy Journal*.

BRICK-CLAY. A term applied to almost any kind of plastic clay of low grade. Such a clay shows a high percentage of fusible impurities and burns to a red or buff color. Brick-clays are very widely distributed, underlying large areas in many parts of the United States and other countries. See BRICK, and CLAY.

BRICKLAYING and **BRICKWORK.** See MASONRY and BUILDING.

BRICKS WITHOUT STRAW. A novel by Albion W. Tourgée (1880).

BRIDAL OF TRIERMAIN', THE. The title of a poem by Sir Walter Scott (q.v.).

BRIDE, BRIDAL, brī'dal (AS. *brȳd*, betrothed, OHG. *brūt*, Icel. *brūdhr*, bride, Goth. *brūths*, daughter-in-law; cf. Gk. *νύμφη, nymphē*, daughter-in-law, bride—probably from *brū*, to cook, brew, make broth, in allusion to her duties in the primitive family). The word bride is common to all the Germanic languages, and also to Welsh (Ger. *Braut*, Welsh *priod*), and signifies betrothed or newly married. Alone, the word denotes the newly married woman; with the addition of the syllable *groom* (a corruption of *guma*, Lat. *homo*, a man), it denotes the newly married man (AS. *brȳdguma*, Ger. *Bräutigam*). Bride is the base of a variety of terms connected with marriage, as 'bride-favors,' 'bride-cake,' etc. Bridal is for bride-ale (AS. *brȳdeal*, the marriage feast). Bridesmaids, or attendants of brides, appear to have been customary among the Anglo-Saxons, and are mentioned in early accounts of marriage ceremonies. A part of their duty consisted in dressing and undressing the bride.

BRIDE-FAVORS are small knots of white ribbons, which are pinned to the breasts of those who are in attendance at weddings. The origin of the bride-favor is said to be the true lover's knot—something symbolical of the union of hearts and hands on the occasion.

BRIDE-CAKE is also symbolical in its origin. The ceremony used at the solemnization of marriage among the Romans was called *confarreatio*, in token of a lasting union between the man and wife, with a cake of wheat or barley (*far*). This is still suggested in that which is called the bride-cake used at weddings. The old English and old Scottish custom of breaking a cake over the head of a bride on entering the new dwelling perhaps points to a usage of the most remote antiquity—the sprinkling of wheat as a token of plenty.

BRIDE OF ABY'DOS, THE. A narrative poem by Byron, described as a 'Turkish Tale' (1813). Its rough draft was written in four nights in the middle of November, and 200 lines were later added. It was adapted for the stage by Dimond five or six years later.

BRIDE OF LAM'MERMOOR', THE. A novel by Sir Walter Scott, further described as 'a legend of Montrose.' It is one of the *Tales of My Landlord* series, and was published in 1819. Calcraft's (Cole's) *Bride of Lammermoor* and Merivale's *Ravenswood*, both dramas, were taken from it, as was the libretto of Donizetti's opera, *Lucia di Lammermoor*. See ASHTON, LUCY. Consult *London Monthly Review*, Vol. LXXXIX., p. 387.

BRIDE OF MESSI'NA, THE (*Die Braut von Messina*). A tragedy by Schiller, founded on the *Œdipus Tyrannus* of Sophocles, produced at Weimar, March 19, 1803. It is technically one of Schiller's most finished works.

BRIDE OF THE RHINE. A name sometimes given to the river Moselle.

BRIDE OF THE SEA. A name of Venice, referring to the traditional rite of marrying the city to the Adriatic Sea in mediæval times.

BRIDE'WELL. A well between Fleet Street and the Thames, dedicated to Saint Bride, which has given its name to a palace, parish, and house of correction. A palace, described as 'a stately and beautiful house,' was built there in 1522 by Henry VIII., for the reception and accommodation of the Emperor Charles V. and his retinue. King Henry himself also often lodged there, as, for instance, in 1525, when a Parliament was held in Blackfriars; and in 1529, while the question of his marriage to Catharine was argued. In 1553 Edward VI. gave it over to the city of London, to be used as a workhouse for the poor, and a house of correction "for the strumpet and idle person, for the rioter that consumeth all, and for the vagabond that will abide in no place." Queen Mary having confirmed the gift, it was formally taken possession of in 1555 by the Lord Mayor and corporation. The Bridewell was afterwards used for other persons than the class above named, and at last became a place of punishment, till its removal in 1864.

BRIDGE (AS. *brycg, bricg*, OHG. *brucca*, Ger. *Brücke*, Icel. *Bryggja*, pier, *brū*, bridge, probably so called from the arch resembling a *brow*, cf. O. Ch. Slav. *brŭvĭ*, brow, bridge). A structure erected to carry a road across a stream, a valley, or other space which it spans from side to side. Bridge-building is so ancient an art that it is of little profit to speculate upon its origin. Every bridge structure consists of two parts, technically known as the substructure and the superstructure. The substructure includes the piers and abutments, with their foundations, on which the spanning structure is supported; the superstructure includes the entire spanning structure. Bridge substructure will be treated under FOUNDATIONS; and the present article will be confined to a consideration of bridge superstructures from the historical and modern points of view. As regards their superstructure, mod-

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ern bridges may be classified as: (1) Arch bridges, (a) masonry and (b) metal; (2) girder bridges, (a) plate girders and (b) braced girders or trusses; (3) suspension bridges; (4) draw bridges. These and supplementary headings will be used in this article.

ANCIENT AND MEDIÆVAL BRIDGES.

It is thought that probably the Chinese first employed the masonry arch for bridging streams. All that is known, however, is that bridges and other public works were executed in China B.C. 2000, and that arch bridges of evidently very great age are found in different parts of the Empire, some of which are excellent examples of masonry arch construction. As no bridges have survived from ancient Egypt, which had little use for them, or from Babylonia or Assyria, where they were never attempted on a large or permanent scale, the earliest remaining examples, apart from China, appear to belong to that interesting group of 'Hittite' and 'Pelasgic' tribes that peopled the shores and islands of the Mediterranean in prehistoric times. The Cretans, many of whose cities are known to be of earlier foundation than Troy, Tiryns, or Mycenæ, in their possessions in Asia Minor, Syria, Greece, Italy, and the adjoining islands, connected their cities with a network of macadamized roads requiring bridges, and their work shows that they were skillful engineers. The earliest examples are built with immense abutments and piers of polygonal masonry, connected by wooden planks, like the later one across the Euripus in Eubœa. Then the blocks of the piers were overhung so as finally to meet in an almost triangular false pointed arch, like the gallery at Tiryns and the gate at Arpinum. This was the case at Metaxidi, and across the Pamisus, in Messenia, as well as in a bridge near Sparta. Other early bridges, all of stone, exist near Mycenæ and Phlius. Finally, for narrow rivers, the end piers were connected by true voussoired round arches. This stage was not reached until the Seventh or Sixth Century B.C. in Italy, as is shown by the bridges at Bieda, Cora, and Vulci, and was probably never known in Greece, where the arch was not developed, even for engineering purposes. What the usual Greek method was in historic times is probably shown by the bridge at Assos, where the stone piers are connected by parallel stone lintels, doweled together.

First the Etruscans, and then the Romans, inherited and developed the engineering ability of the 'Pelasgic' tribes. As soon as the building of the Via Appia had initiated, in the Fourth Century B.C., the policy of binding the possessions of Rome together by great macadamized roads, the Romans entered upon an unrivaled career of bridge and viaduct construction, which has furnished models for all succeeding ages until the modern invention of the metal bridge. As in all their public structures, the Romans made their bridges far more monumental and artistic than necessity required. Some of the Republican period remain. The Ponte Lupo and other magnificent bridges and viaducts for the Anio Vetus aqueduct (B.C. 144-140) are great stone arches of tufa and travertine; so is the viaduct near Gabii (Ponte di Nona), probably built in B.C. 124-121, with seven arches, and 285 feet long, still in use. In Rome itself the Æmilian Bridge, in B.C. 179-142, is said to have been the first stone bridge to span the Tiber, all previous bridges having been of wood; and until quite a late date wooden bridges continued in use, especially for wide rivers. Then came the Fabrician Bridge, in B.C. 62, with two round arches, built, like the rest in Rome, of peperino and tufa, faced with massive blocks of travertine, and the only one of these ancient bridges that has remained intact. The Ælian Bridge, or 'Ponte Sant' Angelo,' built by Hadrian in A.D. 136, with eight arches, was the most superb of all, and remains in great part. It was almost rivaled by the later 'Ponte Sisto' of Valentinian. These bridges had a considerable upward grade toward the centre, which added to their architectural effectiveness.

The great roads radiating from Rome like the spokes of a wheel, such as the Via Salaria (Ponte Salaro), Appia, Aurelia, Flaminia, Valeria, Latina, Cassia, Æmilia, required a number of bridges. The Flaminia, commencing at the great Mulvian Bridge, built in B.C. 109, was constructed by Augustus with all its bridges; that at the further end of the road, at Ariminium (Rimini), is the best preserved, with its five great arches and length of 236 feet. Other Augustan bridges, in ruins, are near Borghetto and Narni; and, in the north, near Aosta, Calzi, etc. The great one at Verona is rebuilt, as is that of Vicenza. The spread of Roman dominion to Spain, Gaul, Africa, Greece, Asia Minor, Syria, the Danubian lands, Germany, Britain, meant everywhere the building of great military roads with permanent bridges by the Roman legions, under the direction of their military engineers. The most colossal was the bridge over the Danube, built in A.D. 102 and 103 by Apollodorus, the greatest architect and engineer of his time, for Trajan, to enable the Emperor to conquer Dacia. The stone piers still stand; its superstructure was of wood. Previous bridges of such enormous length had been temporary and on boats. Throughout the countries that had been included in the western provinces of the Empire so little care of the bridges was taken in the Dark Ages that few have survived. In France are those near Châteauneuf, Vaison, and Saint-Chamas, and the foundations of many more. The Spanish Peninsula is the great exception. Its bridges were among the most superb pieces of Roman engineering, and the high culture of the Moors insured their preservation. The best examples are at Martorell, Cuenca, Evora, Alconetar, Cordova, Mérida, Alcántara, Chaves, Orense, Olloniego, Ona, Almazan, and especially the superb example at Salamanca, built, like so many of the others, by Trajan.

Bridges were sometimes erected by private munificence, like the charming one at Saint-Chamas, in France (single span of 41 feet, length 83 feet); or by the coöperative contributions of communes, like that of Alcántara, in Spain, built by Lacer in 105, and consisting of six granite arches 600 feet long, 26 feet wide, and 45 feet above the normal level of the Tagus—a superb structure still standing. Originally there stood triumphal and memorial arches at one or both ends or in the centre of the most important Roman bridges, as is seen on many coins; for example, on the bridge at Antioch and on that at Magnesia; at the Mulvian and Fabrician bridges, Alcántara, Martorell, and many others. The bridge at Saint-Chamas still shows, in a modest way, its two arches intact. Roman bridges, too

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numerous to enumerate, are scattered everywhere. The Roman arched viaducts spanning valleys and carrying the water-supply, such as the 'Pont du Gard,' in France, those of Segovia and Tarragona, in Spain, and of Carthage, are discussed under AQUEDUCTS.

The care of the bridges was intrusted during the Roman rule to the *curatores viarum*, under an administration superbly organized, with special budget; and in the frontier provinces they were under military control. Bridges remained a matter of prime importance, as military movements and efficient taxation depended upon the maintenance of communications. So even at the time when Italy had been devastated by the wars of the Fifth and Sixth centuries, Narses still prides himself on his restoration of a bridge near Rome. The Lombard and Frankish rulers had great difficulty in maintaining any efficiency in the matter of preservation of bridges. Charlemagne and his successors laid the duty upon the local bishop, as well as the imperial commissioner, and as the duties were collected at the bridges it is to be supposed that every effort was made to keep them intact, but with indifferent success, owing to the lack of engineering ability in Western Christendom.

Considering now the history of ancient bridge-building in the Orient, the earliest specimens extant would appear to be two in Persia, at Dizful and Shuster, belonging to the late Achæmenid kings, though they may not be earlier than some of the Roman bridges; they are interesting as having the wide pointed arches that became so characteristic of Mohammedan architecture. The network of Roman roads throughout Asia Minor and Syria, with their magnificent bridges (e.g. at Apamea), was maintained in good condition by the Byzantine rulers, and new ones were erected, witness that near Adabazar, built in 561 by Justinian, 1400 feet long, with 8 arches of 75 feet span; that at Adana in Cilicia, with 18 arches on enormous piers, and that at Mopsuestia with 9 arches—both erected by Justinian. The Arabs continued this tradition by utilizing the services of both Persian and Greek engineers, and continuing the service of military roads, with regular stations for relays and the accommodation of travelers (see CARAVANSERAI). There were great bridges at Cordova (A.D. 717), at Hama (Hamath) with 11 arches, Antioch with 4 arches, near Aleppo with 13 arches, Adana, Aspendos, Beirut, with 7 arches, and many other places. As was the case in Spain, the care of the Byzantine and Mohammedan rulers and the continuity of their civilization insured the preservation of the Roman bridges and the creation of new ones of monumental design, while in Europe the old traditions had been lost for nearly six centuries. Sultan Beybars, for example, was a great bridge-builder in Syria and Egypt, as at Lydda and Damia.

With the revival of architectural and engineering skill in the Eleventh and Twelfth centuries in Europe, and the contemporary development of great cities, bridge-building awoke to new life throughout Europe. Broad rivers, heretofore crossed by ferries, were successfully bridged. Bridges on the outskirts of cities were strongly fortified, with high towers at the ends and sometimes in the centre, like the Valentré Bridge at Cahors. The mediæval bridges were generally more steeply graded than the Roman. A small but very picturesque example of a very steeply graded bridge is near the Baths of Lucca (Tuscany), hence called 'Ponte del Diavolo.' Some had two passageways, and a few, like that at Croyland, had three. This structure, which is one of the most curious of the early bridges, is known as the 'Trinity Bridge,' and is supposed to have been built about 1380 by the Abbot of Croyland in Lincolnshire. It stands at a point where the main stream of the river Welland divides into two branches, and the three arches provide for three watercourses and three roadways. Strictly speaking, the bridge consists of three half arches rising from the apexes of an equilateral triangle and meeting at a common point over the centre of the triangle. Owing to the steepness of its roadway, this bridge could never have been used for vehicles.

The art of bridge-building revived in France earlier than elsewhere, except Italy, and as early as the latter part of the Eleventh Century the great rivers were spanned at Lyons, Tours, Orleans, Vienne, and other large cities. It was considered as pious an undertaking to build a bridge as a church, and worthy of the granting of indulgences. When Bénézet, a shepherd-mason, built (1177-80) the famous Avignon Bridge, nearly 3000 feet long, he founded an association of *fratres pontifices*, or bridge-building brotherhood. The clergy, the monasteries, and the communes all joined in such constructions. Those in the south of France were especially magnificent; such as those of Saint-Esprit (1265-1309), of Béziers (Thirteenth Century), and of Montauban (1303-16), with a tower at each end, the Pont Valentré, at Cahors, with three towers, one in the middle, and the bridge of Orthez, where there is only a central tower. The social conditions of the Middle Ages made this fortification of the bridges a necessity. Germany was far behind France in bridge construction and fortification. Still it possessed some monumental and early examples, the finest being that over the Danube at Ratisbon (1135) with 15 round arches (34 to 53 feet span), followed by that over the Elbe at Dresden (1179-1260) with 24 arches (40-95 feet span). Spain has some famous mediæval bridges, especially at Zamora, Toledo, and Tudela, with from 15 to 20 pointed arches, and others at Placencia (1187) and Logroñō (1138). In England, the great London Bridge (1176-1209), with its nine pointed arches of about 60 feet span, was built by an architect sent from France. This bridge had a covered gallery and was flanked with a double line of booths and shops and became one of the busiest marts of the city. This was often the case with the mediæval bridges erected in the heart of a city, and not necessarily fortified. The famous Ponte Vecchio in Florence (1362) is the best preserved instance of this custom. It was the same with the covered bridge at Mantua and the Rialto Bridge over the Grand Canal in Venice (1588). Italy appears to have been satisfied with wooden bridges until the Thirteenth Century, with few exceptions, and to have lagged far behind northern Europe and the Orient in this respect, though large wooden bridges were in use in France as late as the Fifteenth Century.

Aside from the Santa-Trinità Bridge at Florence, the stone bridges at Massa and Signa are among the finest in Tuscany, and the 'Ponte del Diavolo' near Lucca is one of the boldest. The Renaissance returned to the round-arched style

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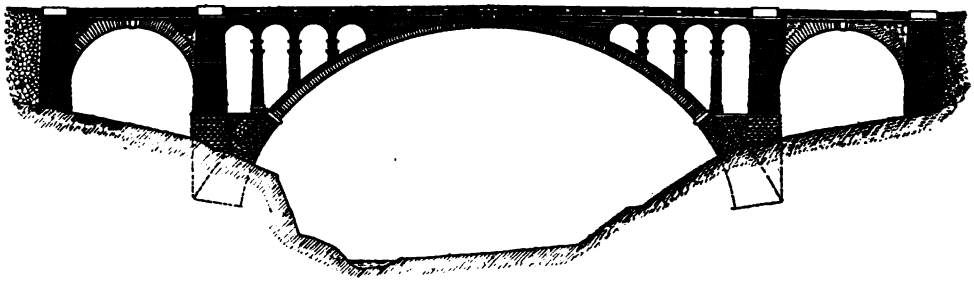
and imitated the Roman bridges, as at Vicenza and Pisa. Among smaller bridges, the 'Bridge of Sighs' at Venice (close of Sixteenth Century), connecting the Ducal Palace and the prisons, is the most famous. Such high-bridged passages were frequent in Italian cities and very picturesque. The work of the Brothers of the Bridge and their priestly successors carried the history of bridge-building up to about 1700, by which time such improvements had come to be regarded as the work of the Government.

During the Eighteenth Century a large number of important stone-arch bridges were built in Europe, among which may be mentioned the Blackfriars, Westminster, Winston, and Kelso bridges in England, and the Blois, Trilport, Tours, Neuilly, and Gignac bridges in France. In all respects the work of the famous department of Ponts et Chaussées in France led the world in arch-bridge construction during the Eighteenth Century. The Blackfriars Bridge across the river Thames was begun in 1760 and completed in 1770. It consists of nine elliptical arches, the middle one being 100 feet, and the others decreasing gradually to 98 feet, 93 feet, 83 feet, and 70 feet. The Westminster Bridge was begun in 1738 and completed in 1750; it consists of fifteen arches, the centre one of which is 76 feet, and each succeeding one on each side four feet shorter than the preceding, except in the case of the two end spans, which are 25 feet. The Winston Bridge over the river Tees, built in 1762, is notable for its span of 108 feet 9 inches. The Kelso Bridge over the river Tweed was completed in 1799, and consists of five arched spans of 72 feet each. The Blois Bridge over the river Loire was begun in 1720, and consists of eleven elliptical arches from 54 feet 9 inches to 86 feet 4 inches span. This was the first bridge built after the establishment of the Ponts et Chaussées in France. The Trilport Bridge over the Maine was finished in 1760, and consisted of a middle arch of 81 feet and two side arches of 76 feet 9 inches, built on a skew, the axes of the arches making an angle of 72° with the axis of the bridge. The bridge of Tours on the Loire, begun in 1755, is one of the longest stone-arched bridges in France, consisting of fifteen elliptical arches of 80 feet span separated by piers 16 feet thick. The bridge of Neuilly, on the Seine, was begun in 1768 and finished in 1774, and consists of five elliptical arches of 128 feet span each. The bridge of Gignac, on the Hérault, was finished in 1793; it consists of two semicircular arches of 83 feet span and an elliptical centre arch of 160 feet 9 inches span. In some respects, the most notable stone-arch bridge of the Eighteenth Century was the so-called Pont-y-Tu-Prydd, over the river Taff in Wales, which was built by William Edwards, an ordinary stone-mason, in 1750, after two failures. The bridge, as finally completed, has a segmental arch span of 140 feet with a rise of 35 feet. A curious feature of this bridge is that its breadth increases from 14 feet 5 inches at the crown of the arch to about 16 feet at the abutments.



LUXEMBURG STONE-ARCH BRIDGE.

MODERN ARCH BRIDGES.

Masonry Arches. With the beginning of the Nineteenth Century, the masonry arch, which had up to this time been prominent in the field of bridge construction, encountered a rival in the metal bridge, first in the form of the arch and suspension bridge and later in the form where girders were employed. The close of this century saw the metal bridge paramount over the masonry arch in all respects, except when judged from the standpoint of beauty and durability. These points of superiority, however, have maintained, and probably will continue to maintain, the masonry arch prominent among the bridge types of the engineer. The number and variety of stone-arch bridges built during the Nineteenth Century preclude a mention of more than a few representative examples. In 1832 the Grosvenor Bridge over the river Dee at Chester, England, was completed with a single arch span of 200 feet. The Trezzo Bridge, constructed over the Adda, in Italy, in 1380, and destroyed in 1416, had a single arch span supposed to have been 251 feet, but, with this possible exception, the Grosvenor Bridge was at the time of its construction the largest stone-arch span ever built. In 1853-59 the construction of the Cabin John Arch near Washington, D. C., with a span of 220 feet, transferred the possession of the longest stone arch in the world to America, but as the Cabin John Arch was built to carry an aqueduct, the Grosvenor Bridge remained the largest span of masonry arch bridge for transportation purposes until 1888. In 1901 there was completed at Luxemburg the largest stone arch; it has a span of 277 feet, and is 137.76 feet above the brook which it bridges.

The accompanying table gives the main dimensions of a number of the leading stone-arch bridges of the world. Structurally, the stone-arch bridge of the Nineteenth Century cannot be said to show much improvement over that of preceding times, but the advance in the science of statics gave the Nineteenth Century engineer a better theoretical knowledge of such structures than was enjoyed by his predecessors. The distinctive development of the Nineteenth Century

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1. STEEL ARCH BRIDGE, over Niagara River.

2. CANTILEVER BRIDGE, over Hudson River at Poughkeepsie.

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in masonry arch-bridge construction has been the concrete arch with a metal skeleton and arches with hinges in the ring. Concrete, in which a skeleton of metal rods, beams, or netting is imbedded, is one of the systems of arch construction which has gained prominence in recent years. One of the longest structures of this type so far built is the Topeka (Kansas) Bridge, consisting of five 125-feet spans, two 110-feet spans, and two 97½-feet spans. Each arch is of concrete, in which are imbedded twelve lattice girders of steel, spaced three feet apart and bent to the curve of the arch. Numerous other spans of this and other systems of concrete metal construction have been built in Europe and America. Concrete arches without metal skeletons are less commonly used. Perhaps the most notable use of the plain concrete arch so far recorded was in the extension of the West Highland Railroad of Scotland in 1897-98. The longest single span employed was 127 feet, but most of the arches used were of 30 feet and 50 feet span; the largest structure had twenty-one 50-feet semicircular arch spans, and a total length of 1248 feet. Hinged arches of concrete have been built in considerable numbers in Europe. The hinges are sometimes true hinges of metal or stone placed at crown and abutments, and sometimes are simply lead joints placed at crown and abutments, and often, also, at the quarter points. The following are the most important hinged concrete arches actually built: *Railway.*—Saxony, span 42.64 feet, rise 9.84 feet, thickness of ring 1.64 feet to 1.96 feet, hinges of sandstone, with convex surface and concave bearing, built in 1880; Munderkingen, Württemberg, span 164 feet, rise 16.4 feet, arch ring at crown 3.28 feet thick, hinges of steel at crown and abutments, built 1893; Rithenstein, Württemberg, span 75.44 feet, hinges consisting of lead joints at crown and abutments, built 1893; Hohenzollern, over the Kaiser Wilhelm Canal, Germany, span 98.44 feet, rise 9.84 feet, hinges of granite, bushed with sheet lead, built 1896. These bridges have given excellent service and have developed no cracks. The claim made for the hinged arch is, that it is statically determinate, and that since the hinges allow for a certain amount of distortion of the arch ring without rupture, less care and expense are necessary in securing absolutely immovable foundations.

The preceding paragraphs, at best, touch only in the briefest way the development, design, and construction of masonry-arch bridges. For a discussion of the theory of the masonry arch, see *A Treatise on Masonry Construction* (New York, 1899), by Prof. I. O. Baker, and *A Treatise on Arches* (New York, 1897), by M. A. Howe, and for descriptions of prominent structures of this type, see *Encyclopædia of Civil Engineering* (London, 1847), by Edward Cresy, and the volumes of *Annales des Ponts et Chaussées* (Paris, 1831, current); *Proceedings, Institution of Civil Engineers* (London, 1838, current); and *Engineering News.*

METAL ARCHES. The first all-iron bridge ever built was a cast-iron bridge of 102 feet span crossing the river Severn at Coalbrookdale, in England. This bridge was built in 1776-79. In 1794 a similar bridge was built near Laasan, in Silesia, Germany, and was the first iron bridge constructed on the Continent of Europe. Both the Coalbrookdale and Laasan bridges were standing in 1900, and carrying their traffic with perfect safety. As time passed, cast iron was replaced by wrought iron, and the latter in turn by steel in arch-bridge construction. An equally important development in fitting the metal arch to fill the prominent place which it has occupied in bridge construction was the adoption of hinges. At first, following the example of stone arches, hinges were entirely dispensed with, the arch structure being consequently statically indeterminate. Hinges had been suggested early in the Nineteenth Century, but it was not until 1841 that European mathematicians began the notable series of studies which finally developed the perfected theory of the hinged arch. In the railway bridge over the Saint-Denis Canal, on the Paris-Creil line, built in 1858, hinges were inserted at the abutments. In 1864 an arch bridge over the river Wien, in Austria, was built with hinges at both the crown and abutments. From this time on the development of the hinged metal arch was rapid, particularly in Continental Europe, although it did not by any means replace the hingeless arch entirely. With this brief sketch of the development of the metal-arch bridge, attention will be turned to a few representative structures of this type.

TABLE OF DIMENSIONS OF NOTABLE STONE-ARCH BRIDGES

NAME	Place	Country	Date Built	No. of Spans	Span, feet	Rise, feet
.....	Luxemburg	Germany	1901	1	277.65	101.68
Trezzo	Trezzo	Italy	1380	1	251	87.8
Cabin John	Maryland	U. S. A.	1857-64	1	220	57.3
.....	Jaremcze	Austria	1842-3	1	213	59
.....	Lavaur	France	1888	...	201.7	90.2
Grosvenor	Chester	England	1832-3	1	200	42
.....	Turin	Italy	1833	1	200	42
Gour Noir	Uzerche	France	1888-9	1	196.8	52.8
Vieille Brioude	Brioude	France	.....	1	183.7	60
Ballochmoyl	Ballochmoyl	Scotland	.....	7	180 max.	90

As the most notable example of the cast-iron bridge, now seldom built, mention may be made of the Southwark Bridge across the river Thames, London, which was erected in 1819. This structure has two side spans of 210 feet and a centre span of 240 feet, with a rise to the arch of one-tenth the span in each instance. The arch ribs were composed of cast sections like the stones of a masonry arch, and at best the bridge was little more than a heavy and wasteful imitation of a stone ring. The main dimensions of a number of other cast-iron bridges are given in the accompanying table. Probably not more than three cast-iron bridges were built during the twenty-five years preceding 1901, while the number of wrought-iron and steel arches built during that time of sufficient span to be noted in engineering literature number over seventy-

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five. In 1873 the arch bridge over the Mississippi at Saint Louis, Mo., was completed with a centre span of 520 feet and two side spans of 502 feet; each span consisted of four parallel cast-steel arch ribs, and the bridge carried two railway-tracks and a highway. The cost of the Saint Louis Bridge was about $5,300,000. No other instance of a bridge of important size being built of cast-steel arches was recorded until 1899, when the Alexander III. Bridge, across the Seine at Paris, was completed with a single span of 352.6 feet, the arch ribs being made up of wedge-like cast-steel sections bolted together. Unlike the Saint Louis Bridge, which was built without hinges, the Alexander III. arch had hinges at the crown and abutments. The longest span arch bridge of wrought steel in the world is the highway and foot bridge built across the gorge of the Niagara River, just below the Falls at Niagara, in 1898-99, with a single span of 840 feet. In 1897, a steel-arch railway bridge was built across the same stream about a mile farther downstream, with a span of 550 feet. Both of these structures were erected without false works to support the metal during erection; each half arch was built out from the shore, member by member, and held back by strong anchors to the shore until the ends met at mid-stream. One of the handsomest steel-arch structures in the world is the Washington Bridge at New York City, completed in 1889 at a cost of $2,850,000. This bridge has two metal arches of 510 feet span each, flanked at each end by masonry arches of 50 feet span, four at one end and three at the other. The arches of the Washington Bridge and the two Niagara bridges have hinges at the abutments only. Turning to Europe, mention may be made of the Müngsten Bridge across the river Wupper on the line of the Solingen-Remscheid Railway. This bridge has a centre arch span of 590 feet, without hinges, and steel trestle approaches at each end. It was completed in 1897. Two notable German steel-arch bridges of recent construction are the Bonn Bridge and Düsseldorf Bridge over the Rhine at the cities named. The Bonn Bridge has a centre arch of 614 feet span and two side arches of 307 feet span, and the Düsseldorf Bridge has two spans of 595 feet each. In France the Viaur Viaduct, with a single arch span of 721.6 feet, built in 1898-99, holds the record for the second longest steel-arch span in the world. In England there is not a single steel-arch span of notable dimensions.

For the discussion of the theory of the metal arch, see a *Treatise on Arches*, by Prof. M. A. Howe (New York, 1897), and for descriptions of notable structures of this type, see the volumes of *Transactions American Society of Civil Engineers* (New York, 1868, current); *Annales des Ponts et Chaussées* (Paris, 1831, current); and the American and European engineering journals.

TABLE OF DIMENSIONS OF NOTABLE METAL-ARCH BRIDGES

NAME	Country	No. of Ribs	Class of Bridge	Date Built	Kind of Metal	Longest Span, feet	No. of Hinges
Niagara (N. Y.)	U. S. A.	2	Highway	1898-9	Steel	840	2
Viaur River	France	2	Railway	1898-9	"	721.6	3
Bonn	Germany	2	Highway	1898	"	614	2
Düsseldorf	"	2	"	1896-8	"	594.5	2
Oporto	Portugal	2	H'w'y & Ry.	1885	.....	566	0
Müngsten	Germany	2	Railway	1896-7	Steel	557.6	0
Niagara (N. Y.)	U. S. A.	2	"	1897	"	550	2
Garabit	France	2	"	1884	Wrt. Iron	541.3	2
Levensau	Germany	2	H'w'y & Ry.	1894	Mal. Iron	536	.....
Oporto	Portugal	2	"	1877	.....	524.5	2
Saint Louis (Mo.)	U. S. A.	4	"	1873	Cast Steel	520	0
Grünenthal	Germany	.....	"	1892	Wrt. Iron	513.5	2
Washington (New York City)	U. S. A.	6	Highway	1886-9	Steel	508.8	2
Southwark	England	8	"	1819	Cast Iron	240	0
Wearmouth	"	6	"	1793	"	236	0
Saint Louis	France	.....	"	1860-62	"	210	0
Rock Creek (Wash.)	U. S. A.	2	"	1858	"	200	0

SUSPENSION BRIDGES.

In their crudest form of two parallel cables carrying a floor directly on the cables, suspension bridges have doubtless been used since very early times. Such bridges, with the cables composed of vegetable fibre and creepers, have been found to be used by the aborigines of many countries. It is probable that the Chinese suspension bridges built during the Sixteenth Century were of this construction, and it is certain that it was the construction of the few European suspension bridges which were built previous to 1800. The first suspension bridge of the modern form, having a platform or a roadway suspended from the cables, is considered to have been erected by Joseph Finley, near Greensburg, Pa., in 1801. The span was short (only 70 feet), but it consisted of two chain cables passing over shore towers to inshore anchorages, and had a platform suspended from them. Several other bridges of the same general construction were built by Finley and others in succeeding years up to 1816, when a foot bridge of 408 feet span was built over the Schuylkill River at Philadelphia, whose cables were made of wire. In 1819 the first suspension bridge in England built with a suspended platform was erected over the river Tweed. In 1826 the famous chain suspension bridge across the Menai Strait was completed, with a total length of 1710 feet and a suspension span of 580 feet. In Continental Europe suspension-bridge construction was begun about 1820, and in 1834 Continental engineers established the world's record in long suspension spans by building the Fribourg Bridge in Switzerland, with a span of 870 feet. In 1848 the United States again took the lead through the erection by Charles Ellet of a suspension span of 1010 feet at Wheeling, W. Va. These early suspension bridges were flexible

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STEEL TRUSS BRIDGE, OVER THE DELAWARE RIVER, PHILADELPHIA.
1. THE COMPLETE STRUCTURE. 2. LOOKING THROUGH THE BRIDGE. 3. DRAW SPAN.

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under unsymmetrical loading, and subject to oscillation from wind-pressures. On account of these defects, they gained but scant favor for roadway structures, and were totally disregarded for railways. The possibility of the suspension bridge for railway bridges was established by the work of John A. Roebling in building the suspension bridge to carry the Grand Trunk Railway across Niagara Gorge in 1855. In this structure Mr. Roebling placed a stiffening truss on each side of the platform, and by this means gave the structure great rigidity. He also increased the resistance of the bridge against wind-pressure by inclining the cables toward each other from each tower toward the centre of the bridge. He also used inclined stays from the tops of the towers to the platform, and this is the only feature of Mr. Roebling's design which has been discarded in modern practice, for the reason that such stays inevitably produce some uncertainty in the transmission of the load to the cable. The Niagara Suspension Railway Bridge had a span of 821 feet, a width of 15 feet, and the platform and its wooden stiffening truss was suspended from two 10½-inch cables. These cables were composed of seven parallel strands of 520 parallel wires each. In 1881 the old wooden stiffening trusses were replaced by steel ones, and in 1887 the old masonry towers were replaced by steel towers. In 1897 the whole structure was replaced by the 550-foot steel arch previously described. Following the Niagara Bridge, Mr. Roebling built the Cincinnati and Covington Suspension Bridge in 1867, with a span of 1057 feet and a total length of 2252 feet, the supporting cables being 12¼ inches in diameter. This bridge was for highway and street-railway traffic. In 1897-98 it was strengthened by building two new cables directly over the old cables, and otherwise remodeling the ironwork. In 1872 Mr. Roebling began the construction of his greatest work, the New York and Brooklyn Suspension Bridge, which was carried to completion in 1883 by his son, Washington A. Roebling. This is the longest suspension bridge in the world, but it is surpassed in span by the new East River Bridge, the construction of which was begun in 1897. The main structural features of the New York and Brooklyn Bridge are, briefly, as follows: Length of river span, 1595½ feet; length of each land span, 930 feet; length of Brooklyn approach, 971 feet; length of New York approach, 1562½ feet; total length of bridge, 5989 feet; width of bridge, 85 feet; number of cables, 4, each consisting of 6300 parallel (not twisted) steel wires of No. 7 gauge, closely wrapped in a solid cylinder about 15½ inches in diameter and having an ultimate strength of 11,200 tons; total cost, $9,000,000, exclusive of land. (See FOUNDATION.) The new East River Bridge crosses the East River at a point about 2 miles above the New York and Brooklyn Bridge, and has the following dimensions: Clear span, 1600 feet; length between terminals, 7200; total width, 118 feet; clear height for 100 feet each side of the centre, 135 feet; capacity, 4 trolley-car tracks, 2 elevated-railway tracks, one drive, and 2 footwalks; 4 cables, 17½ inches in diameter, formed by strands of parallel steel wire 0.203 inch in diameter; height of towers, 235 feet, composed of masonry 20 feet above water, and of steel framework above that point. The following are the chief points of difference between this bridge and the older Brooklyn Bridge: The use of steel towers instead of masonry; the omission of all inclined stays; the support of the shore spans entirely independent of the cables; and the use of riveted instead of pin connections for the stiffening trusses. (See FOUNDATION.) A form of suspension bridge which has been considerably used is one in which the cables are braced together. The Point Street Bridge, of Pittsburg, Pa., built in 1878, with a span of 800 feet, belongs to this class of structure; and one of the designs for a suspension bridge across the North River at New York City has the upper and lower cables on each side connected by a rigid X-bracing. As indicating the length of span for which engineers consider suspension bridges available, it is interesting to note that this proposed structure is designed with a clear span of 3100 feet. For the theoretical discussion of suspension bridges, reference may be made to the text-books mentioned at the end of this article; for a concise description of the methods of cable-making on the New York and Brooklyn Bridge, see *Cable-Making for Suspension Bridges*, by Wilhelm Hildenbrand; for description of notable suspension bridges, see the volumes of the engineering periodicals.

GIRDER BRIDGES.

On account of its general applicability and wide utility, the girder bridge is perhaps the type of bridge structure most available to the engineer. The three forms of girder bridge which have been used are the plate girder, the box or tubular bridge, and the braced girder or truss. The tubular girder is now never used, and the plate girder is used only for comparatively short spans. Briefly described, a plate girder consists of a top and bottom flange connected by a solid web plate; in cross-sections a plate girder resembles a letter I. To form a plate-girder bridge, two or more plate girders are placed parallel, with their ends resting on piers or abutments, and with a platform or floor between them. Plate girders are particularly suitable for spans less than 100 feet, but they are occasionally built in greater lengths up to 150 feet. They are much used in elevated railways and in trestle viaduct construction, and for railway bridges up to 100 feet spans. The tubular girder may be popularly defined as a rectangular tube of metal plates. Usually the sides of the tube consist of single plates, while the top and bottom have a cellular construction consisting of two plates separated by vertical diaphragms. The tubular bridge was the development of special conditions, and as soon as these had ceased to exist it disappeared from engineering practice. The possibilities of the tube for carrying a level railway across a large span were brought into general notice by Robert Stephenson, engineer of the Chester and Holyhead Railway, in the construction of the bridges to carry that railway across the Menai Strait. It was required by the British Admiralty that these bridges — called the Britannia and the Conway—should be constructed so as not to interfere with navigation, with clear spans of upward of 400 feet. The longest arch spans that had previously been constructed did not exceed 240 feet, and suspension bridges, as built at that date, not being suitable for heavy and rapid rail-

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way traffic, the engineers were obliged to devise some new form which should conform to the stipulated conditions. Mr. Stephenson, having decided on the tubular form, proceeded, in conjunction with Mr. Fairbairn, to make an elaborate series of experiments on tubes, to determine the most suitable arrangement of the wrought iron of which they were composed. They found that a rectangular tube, of which the top and bottom were cellular, gave the greatest strength with the least material. The span of the Conway tube was 400 feet, while the tubular part of the Britannia Bridge consisted of two spans of 460 feet and two of 230 feet each in the clear. The foundation stones of these bridges were laid in 1846 and 1847, respectively. In 1854 work was begun on the most important tubular bridge ever built—the Victoria Bridge over the Saint Lawrence River, near Montreal, Canada. The total length of this bridge is 9144 feet, or nearly 1¾ miles, and it was built in 24 spans of from 242 to 247 feet each, and one of 330 feet. About 9000 tons of iron were used in the tubes. In 1898-99 this bridge was replaced by a pin-connected truss bridge having 24 spans of 254 feet and one span of 348 feet, and requiring 20,000 tons of steel in its construction. The Victoria Bridge was the last important tubular girder bridge to be built. By the date of its completion, in 1859, the practicability of the suspension system for railway bridges had been established by the inventions of Roebling, and the application of wrought iron to braced girder bridges had proved the possibility of constructing them in long spans.

The braced girder or truss bridge is the most common form of bridge now in use. Briefly described, a truss consists, first, of an upper and lower member, each continuous throughout its length, called the upper and lower chords; and, second, of an open bracing of diagonal members, or diagonal and vertical members combined, which connect these two chords rigidly together, and which are called the web members or trussing. The web members are connected to the chords by pins or by rivets, the truss being called a pin-connected truss in the first case and a riveted truss in the second case. A truss is continuous when it extends over several supports. Different forms of trusses have different outlines and different arrangements of the web members. A truss bridge, in its simplest form, consists of two trusses placed parallel to each other, with their ends resting on piers and abutments, and with a floor constructed between them. When the floor is in the plane of the bottom chords, the traffic passes across the bridge between the trusses, and the bridge is called a through bridge; when the floor is in the plane of the top chords, and the traffic passes above the trusses, the bridge is called a deck bridge. In a properly designed truss the chords and web members are subjected only to tensile and compressive strains. The braced girder or truss, as will be inferred from what has preceded, is a modern development of an efficient and popular bridge type. Its first extensive use was in America, with wood as the structural material. The earliest of these American timber bridges were built by Theodore Burr and Timothy Palmer. The Burr truss consisted of a timber arch rib combined with a stiffening truss, and one of the first bridges in which it was used was at Waterford, N. Y., and had four spans of 154 feet, 161 feet, 174 feet, and 180 feet. The Harrisburg (Pa.) Bridge, which was also a Burr truss bridge, had 12 spans of about 210 feet each. The type of bridge built by Timothy Palmer had a curved bottom chord and a straight top chord, with X-bracing connecting them. A bridge of this type was built over the Schuylkill River, at Philadelphia, Pa., in 1806, which had a centre span of 195 feet and two side spans of 150 feet each. In 1829 Ithiel Towne invented a truss with parallel horizontal chords and a web system consisting of a close lattice-work of diagonal members. This was followed by a truss with parallel horizontal chords separated by a web system of vertical parts, with X-bracing between them, invented by Col. S. H. Long, United States Engineers, in 1850. The first Long truss bridge of which there is any definite record was the Washington Road Bridge, near Baltimore, Md., with a span of 109 feet. All these early truss bridges were built entirely of wood. In 1840 William Howe invented a truss with parallel horizontal chords connected by iron verticals with wooden X-bracing between them. In 1844 Caleb Pratt invented a truss which was a combination of iron and wood, and in which the web system consisted of wooden verticals with iron X-bracing between them. The combination truss of Howe came into extensive use for both railway and highway bridges, one of the most notable being the Havre de Grace Bridge, built in 1850, with 13 250-feet spans and a 176-foot draw span. The Pratt truss did not lend itself easily and cheaply to combination construction, and never attained much popularity, as long as wood and iron were used in combination. The first iron bridges in America were built with cast-iron upper chords and struts, and wrought-iron lower chords and diagonals. Squire Whipple, Wendell Ballman, and Albert Fink designed combination cast and wrought iron bridges, and developed special truss systems in America, while abroad Schwedler, Navier, and Warren performed a similar work. About 1860 bridges built of wrought iron began to be considered, and shortly afterwards the old cast and wrought iron combination structure had practically disappeared from use. To attempt to outline the development of the truss during all of the years in which it has been coming to its present state of perfection would involve the reader in technicalities which belong only in special treatises. It is also impossible to record even the principal truss spans which have been built. In 1889 Mr. Theodore Cooper estimated that the railways of the United States alone had over 29,000 iron bridge spans. A few of the most notable simple truss bridges of the world are the following: Cincinnati and Covington, double-track railway, over Ohio River, with one span 545 feet, two spans 490 feet; total length, over one mile; total steel contained, 10,180 tons. Henderson, Ky., over Ohio River; total length, 3688 feet; 16 spans; longest span, 525 feet. Ohio Connecting railway, Pittsburg, Pa.; longest span, 523 feet. Norfolk and Western Railroad, over Ohio River, at Credo, W. Va.; two spans 301 feet, two 304 feet, and one 521 feet. Cairo, Ill., over Ohio River; two spans 518½ feet, seven spans 400 feet, three spans of 249 feet; total length, with viaduct, 10,560 feet. Cin-

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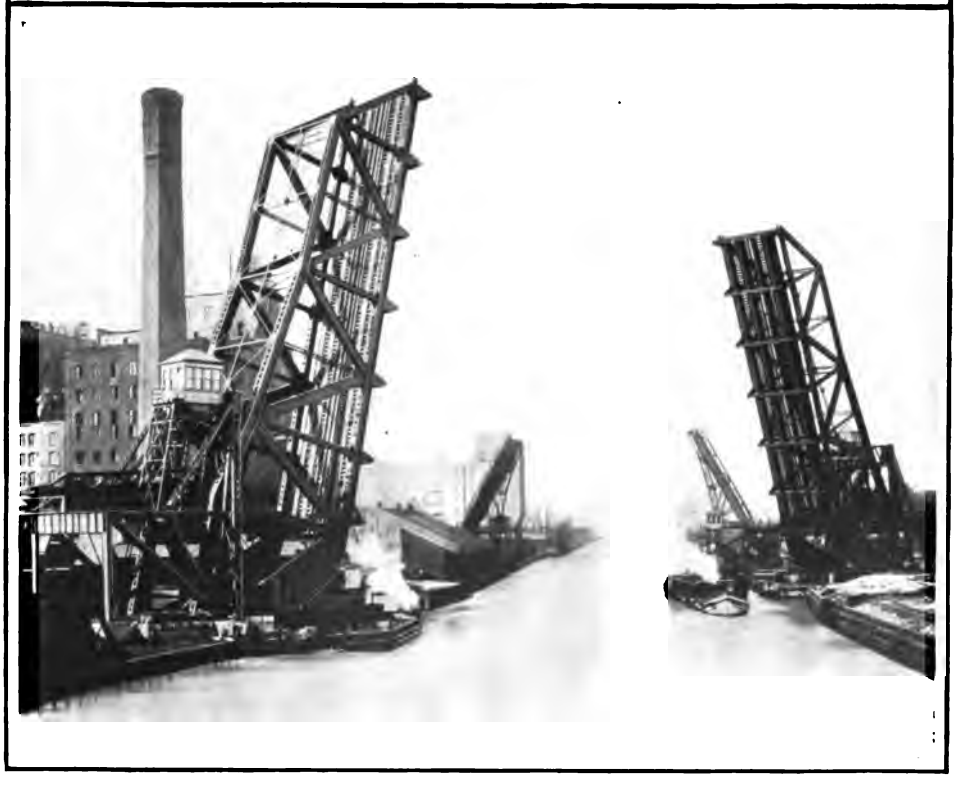

SCHERZER ROLLING LIFT (Bascule) BRIDGE, over Chicago River; open and closed.

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cinnati, Ohio, over Ohio River; five spans, having total length of 1600 feet; longest span, 515 feet. Kuilenburg Bridge, over the river Lek, Holland; one span, 515 feet; this bridge was built in 1866, and until 1877 was the longest simple truss span in the world. In England, the Saltash Bridge, built in 1859, with two of its 19 spans 455 feet long each, is the longest simple truss bridge. Of 92 remarkable German simple truss bridges whose statistics have been tabulated by Prof. Georg Mehrtens, only seven have a span of over 300 feet, the longest being the road bridge over the Saale, at Kalbe, with one span of 350 feet.

Continuous-truss bridges are comparatively little used, but are far more popular in Europe than in America. A continuous truss, as already stated, differs from a simple truss by extending continuously over three or more supports. Theoretically, a continuous-truss bridge requires less material than a bridge with the same number of simple-truss spans; but it has a number of practical disadvantages which make engineers loth to use it. Perhaps the most notable continuous-truss bridge in the world is the Lachine Bridge across the Saint Lawrence River at Montreal, Canada, built in 1887. It consists of two centre through spans of 408 feet each and two side spans 269 feet, forming a continuous structure over five piers.

Cantilever bridges are, strictly speaking, hinged continuous girders. They were not much used until the last quarter of the Nineteenth Century, when the building of the Kentucky Viaduct (1876) and the Niagara Cantilever (1883) demonstrated the practicability of erecting such bridges without the use of supporting false works. Since these dates numerous cantilever bridges have been erected in both Europe and America. Briefly defined, a cantilever bridge consists of a continuous-truss span starting from an abutment and extending over and beyond a second support on each side of the stream. The two projecting ends are connected by a truss span suspended from them. The shore ends of the spans are anchored to the abutments. The Niagara Cantilever Bridge, completed in 1883, has a total length between abutments of 910 feet. The projecting arms or cantilevers are each 175 feet, and the truss span which they support is 175 feet long. The Saint John River (New Brunswick) Cantilever, built in 1895, has a total length of 813 feet and a main span of 477 feet. The Poughkeepsie Bridge, built in 1889, has a total length of 6767 feet, with five river spans, of which the first, third, and fifth are cantilever spans, and are 548 feet, 546 feet, and 548 feet, respectively. The Red Rock Cantilever Bridge, built in 1890, Red River, Cal., has a total length of 990 feet and a centre span of 660 feet. The Memphis Bridge, built in 1892 over the Mississippi River, at Memphis, Tenn., has a truss span of 621 feet and two cantilever spans of 790 feet, which are the longest cantilever spans in the United States. The longest cantilever span in Continental Europe is the 623-foot span of the Danube Bridge, near Czernavoda, in Rumania. Great Britain has the honor of having at present the longest cantilever span in the world, in the great Forth Bridge across the Firth of Forth, in Scotland. This bridge has two cantilever shore arms of 680 feet, and two main cantilever spans of 1710 feet. It was begun in 1883 and was completed in 1890. The Quebec Bridge across the Saint Lawrence River, upon which construction was begun in 1900, has a main cantilever span of 1800 feet. For theoretical discussions of girder bridges, see the text-books named at the end of this article; and for descriptions of many of the prominent structures mentioned, see *Transactions American Society of Civil Engineers;* T. Cooper, *American Railway Bridges;* and the volumes of the engineering journals.

DRAWBRIDGES.

Under the generic term of drawbridges are included all forms of bridges designed to be opened and closed so as to give passage alternately to vessels and to the road or railway traffic passing over the bridge. Drawbridges may be divided into the following types: Swing bridges, in which the opening span swings horizontally on a turntable or vertical pivot carried by the pier supporting the span; bascule bridges, which consist of one or two draws hinged at the abutment on horizontal shafts so that they are opened by raising the bridge to a vertical position, leaving the channel clear; rolling bridges, which have the span mounted on rollers, so that it may be hauled inshore and leave the channel clear; lift bridges, in which the span is placed between two tall towers and so arranged that it is lifted clear of passing vessels, like an ordinary passenger elevator. There are several modifications of each of these types, some of these being patented in part, and for these the special treatises on bridge construction, which are mentioned later, should be consulted.

The most commonly used form of a drawbridge is the swing bridge. Generally the supporting pier, called the pivot pier, is placed under the centre of the span, which is always either a plate girder or a truss span. Sometimes, however, the pivot pier is located nearer to one end of the span than the other, in which case the shorter arm has to be counterweighted to balance the longer arm. When a swing bridge is open, the axis of the span is parallel to the axis of the stream; there are two open channels on each side of the centre pier and the ends of the span are swung clear of any support. When the bridge is closed the ends of the span are supported on piers. The longest swinging span ever constructed is that for the Interstate Bridge at Omaha, Neb., which has a total length of 520 feet. The Thames River Drawbridge, New London, Conn., has a swing span of 503 feet, and the Arthur Kill Drawbridge between Staten Island, N. Y., and the New Jersey mainland, has a swing span of 496½ feet. The manner of supporting a swing span on the pivot pier so that movement is possible is quite simple. A casting at the centre of the pier carries a vertical pivot. Around this pivot as a centre is bolted to the pier a circular track having gear-teeth on the outer circumference. To the bottom of the span is attached a circular drum of the same diameter as the track on the pier, and at the centre of this drum is a socket which fits over the pivot on the pier. Between the bottom of the drum and the pier-track is placed a chain of rollers kept in position by radial arms running to the centre pivot. The span swings on these rollers, the centre pivot serving only to hold it in position or true to its centre. Movement is brought

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about by a vertical shaft running in bearings attached to the outside of the drum and having a gear-wheel at its bottom end which meshes into the gear-teeth on the outside of the fixed pier-track; the rotation of this shaft causes the drum to turn on the rollers and swing the span. In large spans two shafts are employed. The motive powers employed to operate the shafts are steam-engines, gas-engines, electric motors, and hydraulic motors. One modification of the centre pier swing span is the form already mentioned as having the pivot pier nearer to one end than the other; another is where the pivot is at the extreme shore end of the span while the other end is supported by a floating pontoon which swings with the span; another consists of two unequal arm spans with their pivot piers in the opposite banks, and the ends of the long arms meeting and locking over the centre of the channel.

During recent years there has been a notable development in the use of *bascule* spans, where the waterways to be crossed are so restricted in width as to prevent further restriction by placing a pivot pier in the centre or where the land along the banks is too valuable to permit space to be taken up by a swing space with a shore pivot pier. Notable bridges of this type have been built in Chicago, Milwaukee, Buffalo, and Boston in the United States, and also in various foreign cities. The Tower Bridge, crossing the river Thames, near the Tower, in London, has a bascule span of 200 feet, formed of two leaves hinged at the opposite abutments, and meeting and locking at the centre.

Lift bridges are seldom used. Perhaps the most important one ever constructed crosses the Chicago River at North Halstead Street, in Chicago. On each side of the river are erected two steel framework towers 162½ feet high, between which is suspended a truss span 130 feet long. When the bridge is closed this span rests on abutments like any simple-truss span. To open it, steel cables passing from each end of each span up and over sheaves at the tops of the towers, and thence to suitable winding drums at the surface, are wound up, raising the span to near the tops of the towers so that vessels may pass beneath. The clear lift of this bridge is 155 feet above low water.

TRESTLE VIADUCTS.

Originating with the earliest forms of timber trestles, a type of bridge has been developed, chiefly in the United States, which is known as the trestle viaduct, a bridge of wood or metal in which the different spans are supported directly upon legs or towers composed of two or more trestle bents braced together in all directions. The first application of this system to a bridge of any great magnitude was in the Kinzua Viaduct, which is well known for the boldness of its design and its embodiment of the distinctive features of the system. This viaduct was built in 1882, and is located at the crossing of Kinzua Creek, which flows through a gorge some 300 feet below the level of the surrounding country, on the Erie Railroad, in McKean County, Pa. Each trestle tower consists of four legs braced together in all directions; the longest bent in any tower is 279 feet between the top of the masonry and the top of the tower. In 1900 this viaduct was entirely rebuilt to practically the original dimensions, but with steel instead of wrought iron and with heavier and stiffer members throughout. Some years later the general plan of the Kinzua Viaduct was closely copied in the construction of the Loa Viaduct on the Antofagasta Railway in Bolivia. This viaduct spans the canyon of the River Loa in the Upper Andes at an elevation of 10,000 feet above the sea-level, and if counted from the surface of the water to the top of the rails, is the highest in the world, if we except the Santa Giustina Bridge in the Tyrol and the Garabit Viaduct in France, which are merely iron arches over deep gorges and have towers of no great height. The length of the longest bent of the Loa Viaduct is 314 feet 2 inches. In 1893 a viaduct, ranking in size with the Kinzua and Loa, was built to carry the Southern Pacific Railway over the Pecos River in Texas. To enable a comparison between these three most notable examples of the trestle viaduct, the following has been compiled:

	Kinzua		Loa		Pecos	
	feet	inches	feet	inches	feet	inches
Total length	2050	0	800	0	2180	0
Height above water	302	0	336	0	320	10¾
Length of longest bent	279	0	314	2	241	¾
Width of towers c. to c. of bents	38	6	32	0	35	0
Longest span	61	0	80	0	185	0
Width over all	18	0	10	0	16	0
Width c. to c. of trusses	10	0	8	10	10	0
Weight of metal work	1400 tons		1115 tons		1820 tons	

DESIGN, SHOPWORK, AND ERECTION.

The scientific design of a modern metal bridge is a task calling for a high degree of engineering skill, and an attempt to explain this share of bridge work without technicalities must be, to some extent, a failure. Knowing the purpose for which the bridge is to be used and the topography and geography of its location, the first task of the engineer is to decide upon the number and character of the spans. Where the stream is narrow, a single simple span with its masonry abutments will suffice, but for wider crossings two or more such spans will be needed. The length, and consequently the number of these spans has to be determined, and for this problem the engineer has two possible solutions, viz. to make a large number of short spans, in which case the number of piers is a maximum and the cost of the substructure increased, or to make a few very long spans, in which case the number of piers is the maximum, but the cost of the superstructure is increased. Evidently, other things being equal, the solution to be sought is at the point between the two extremes, where the total cost of the bridge, substructure and superstructure combined, is the least. As a rule of thumb, it is assumed that this point is where the cost of the superstructure and the cost of the substructure are equal. It will readily be understood that there are occasions when the engineer does not have a free choice in selecting the number and heights of spans. Such cases arise where the interests of navigation forbid the construction of a pier in midstream, an example of which is the Hudson River at New York, or where the depth of the gorge or of the water in the stream, or a rapid current, or unsuitable bottoms prevent a midstream pier, an example of

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which is the gorge of the Niagara River. In these cases the engineer must use a single long span, and is, therefore, restricted to the types of bridge which will permit great length of clear span, such as the metal arch, the cantilever truss, or the suspension types. In other instances the handsome appearance of the bridge is paramount, and some design which will fulfill this requirement is necessary. If a navigable stream is to be crossed at low level, a drawbridge is necessary. Thus it will be seen that the local conditions and requirements have to be most carefully studied, and the available designs in each case carefully integrated, to secure the one which will best meet the controlling conditions at the lowest cost. The design once selected, the engineer, knowing the loads which the bridge is to carry, proceeds to calculate the character and intensity of the strain in each principal member. This being done and the strength of the material known, it is possible to determine the size required of each member to resist the strain coming upon it. The next process is to determine the form and dimensions of each member and to prepare drawings showing closely the form and these dimensions.

As soon as the detail drawings have been prepared, the engineer draws up a set of specifications stating the location, purpose, and main dimensions of the bridge, the character and strength of the material to be used in each part, the quality of workmanship required in constructing and erecting these parts, and a variety of other stipulations tending to secure in the finished structure the embodiment of his intentions as regards the finished bridge. The detail drawings and the specifications are then submitted to bridge-builders with the request that they make bids for performing the required work. Generally the lowest bid is accepted, providing the engineer is satisfied of the reliability and competency of the person making it to perform the work. After the contract has been let, the bridge-maker receiving it begins the manufacture of the bridge. First wooden templates and models are made from the engineer's drawing of at least the most important members. These are used for marking the shape and dimensions to which the steel is to be cut, and in molding the castings. The steel, being marked, is cut to the required dimensions and forms by shears and planers. Each piece is then sent to the punches, drills, and boring-machines to have the rivet and pin holes bored. The next step is to assemble the pieces forming each member and fasten them together by temporary pins. The assembled member is then taken to the riveting-machines, which drive the permanent rivets. The next step is to finish the member, mark it with its distinctive number, and load it for shipment. The attempt is always made to ship the metal-work in as large sections as possible, since the connections made at the bridge-shops equipped with special machinery for the purpose are more solid and cheaper than those made in the field by portable machinery. At best, however, the bridge material reaches the site of the bridge in a great number of pieces, and the work of connecting these pieces to form the completed bridge is called bridge erection. Metal bridges are usually erected on a supporting falsework of timber, but where such a falsework is impracticable they are built out from one or both ends piece by piece, where the type of structure permits, or are erected on falsework standing on barges which are floated into the proper position to place the complete span on its piers by lowering it onto its seats and withdrawing the barge. After erection, the bridge is painted and otherwise finished, and finally is commonly tested by running a very heavy load over it. The testing finishes the bridge so far as the bridge engineer is concerned. For Pontoon and other forms of military bridges, see BRIDGES AND DOCKS, MILITARY.

BIBLIOGRAPHY. The literature on bridge-building is quite extensive and is widely scattered, much of the most valuable descriptive matter being found in the periodical literature of the engineering profession. Among engineering papers whose columns contain particularly full records of current bridge construction are: *Le Génie Civil* (Paris, 1880, current); *Zeitschrift des Vereins Deutscher Ingénieure* (Berlin, 1857, current); *Engineering* (London, 1866, weekly, current); *Engineering News* (New York, current); and the *Engineering Record* (New York, current). *The Proceedings of the Institution of Civil Engineers* (London, 1838, current); *Annales des Ponts et Chaussées* (Paris, 1831, current); and *Transactions American Society of Civil Engineers* (New York, 1868, current), also contain much important information relating to bridges. Among the more recent text-books and books of reference are: Johnson, *Practice of Modern Framed Structures* (New York, 1900); Du Bois, *Stresses in Framed Structures* (New York, 1896); Merriman and Jacoby, *Roofs and Bridges* (New York, 1900); Waddell, *De Pontibus* (New York, 1898); Wright, *The Designing of Draw Spans* (New York, 1897).

BRIDGE, OF A SHIP. A platform raised some distance above the deck of a vessel for the convenience of the officer having charge of the deck. In modern men-of-war there are usually two bridges extending athwartship and a fore-and-aft bridge between them. The forward thwartship bridge is the one used for purposes of navigation, and it is usually placed ten feet or more above the upper deck. When the bridge expands into a platform of considerable area instead of being merely a narrow promenade, it is frequently called a *bridge-deck*. In very large ships there are usually two or three bridges, one above the other; in which case the lower ones are generally larger, and are called the upper and lower bridge decks.

BRIDGE. A game of cards. It may be said to belong to the whist family of games, although in its recent development there is no direct relationship. It has been played for some time in Turkey and Egypt, in which latter country it is known as *Khedive*, but in neither land is it played so scientifically or with the same details as in England and America. A game closely resembling bridge is played also in Holland, and still another in Russia, where it is known under the name of *Yeralash*. Toward the end of the Nineteenth Century it traveled from Egypt to the south of France, whence it rapidly made its way to Paris and, although meeting with the opposition of whist-players, soon intrenched itself securely in the public estimation. London and New York followed Paris in their devotion to the new game. Bridge is played with one pack of

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52 cards, and the four players constituting the game are known respectively as the *dealer*, the *leader*, the *dummy*, and the *pone*. There are one or two varieties of bridge as there are of whist, and a complete account of them, with the numerous rules of bridge itself, may be obtained from the following excellent authorities: De la Rue, *The Laws of Bridge* (London, 1889); Foster, *Bridge* (London, 1901); Dunn, *Bridge and How to Play It* (London, 1901); Steele, *Simple Rules for Bridge* (New York, 1902).

BRIDGE, HORATIO (1806-93). An American naval officer, born at Augusta, Maine. He graduated at Bowdoin College in 1825, was admitted to the bar, and in 1838 was appointed paymaster in the United States Navy. From that time until 1851 he cruised about, making several visits to Africa, which he describes in the *Journal of an African Cruiser* (1845). He was then made chief of the bureau of provisions and clothing, which position he occupied for fifteen years. Upon his resignation he was appointed chief inspector in the same department, and finally retired with the rank of commodore.

BRIDGE, Sir JOHN FREDERICK (1844—). An English organist and composer, born at Oldbury (Worcestershire). He studied under John Hopkins and Sir John Goss, in 1865 was appointed organist of Trinity Church, Windsor, and in 1869 of Manchester Cathedral. From 1875 to 1882 he was deputy organist of Westminster Abbey, of which he was in the latter year appointed organist. He became successively professor of harmony in Owens College (Manchester) and professor of harmony and counterpoint at the Royal College of Music. His works include *Mount Moriah* (1874), an oratorio; two cantatas, *Boadicea* (1880) and *Callirhoë* (1888); a setting of Gladstone's Latin version of Toplady's "Rock of Ages," for baritone solo, chorus, and orchestra; and many anthems, including one for the celebration of the Queen's jubilee at Westminster Abbey (1887)

BRIDGE, JOSEPH COX (1853—). An English organist and composer. He was born at Rochester, Kent, studied under John Hopkins, and from 1871 to 1876 was organist of Exeter College, Oxford. In 1877 he became organist of Chester Cathedral. There he revived the Chester triennial festival. His works include an oratorio, *Daniel* (1885); a *Magnificat* and *Nunc Dimittis*, in C, for voice and orchestra (1879); and considerable organ-music, anthems, and part-songs.

BRIDGE, NATURAL. See NATURAL BRIDGE.

BRIDGE, WHEATSTONE. See WHEATSTONE BRIDGE.

BRIDGE-BUILDING BROTHERHOOD (Lat. *Fratres Pontifices*). A religious fraternity formed in the south of France in the latter half of the Twelfth Century, to build bridges and keep ferries. As the Church considered such labors meritorious, the societies spread and grew rich. According to tradition, the shepherd boy, Bénézet, received a revelation that he must build a bridge across the Rhone at Avignon. Accordingly, he went to the bishop and told his story, but was repulsed. The provost, however, aided him and work was begun in 1177. The bridge was not completed until 1185, and Bénézet, dying in the meantime, was buried in the chapel in one of the columns of the bridge. He was afterwards canonized. Either the fame of Saint Bénézet, or compassion for persons who were forced to pay large tolls, led to the founding of a brotherhood for the purpose of carrying on the work of bridge-building, and in 1189 Clement III. sanctioned the order. Similar brotherhoods were formed in other parts of France and in the north of Italy. They labored very hard for a time, but soon the possession of wealth led to idleness. In 1277 the Brotherhood of Bonpas wished to unite with the Templars, but instead Nicholas III. united the order with the Knights of Saint John (1278). Other bridge-building brotherhoods continued their activity for nearly three centuries until the dissolution of the order by Pius II. Consult Grégoire, *Recherches historiques sur les congrégations hospitalières des frères pontifes* (Paris, 1818).

BRIDGEND, brĭj'ĕnd. An industrial market-town of Glamorganshire, Wales, 14½ miles southeast of Neath. It is a junction of the Great Western Railway. In the town are ruins of a Norman castle. In the neighborhood are the interesting remains of Ogmore Castle, of Coity Castle, and the castellated ruins of Ewenny Priory, founded in 1146. Blast-furnaces constitute the chief industry. Population, in 1891, 4676; in 1901, 6063.

BRIDGE'HEAD, or (in French) TÊTE-DU-PONT. In military engineering, a fortified work intended to defend the passage of a river over a bridge. See TÊTE-DU-PONT.

BRIDGE'NORTH, ALICE. The heroine of Scott's novel *Peveril of the Peak*. She is the daughter of a stanch Roundhead and the sweetheart of an ardent Cavalier, whom she finally marries at the Restoration.

BRIDGE OF SIGHS, THE. (1) A lofty bridge in Venice, built by Antonio Contino about 1595-1605. It spans the Rio della Paglia, connecting the Doge's Palace with the Carceri Prigioni. Its name was derived from the fact of its leading to the prisons. It is inclosed at the sides, arched overhead, and contains two separate passages. Byron mentions it in the opening lines of *Childe Harold*, Canto IV. (2) A poem by Thomas Hood (1844), on the recovery of the body of a London outcast, who had drowned herself in the Thames. (3) The name is also used of a bridge connecting the Tombs prison in New York with the court-rooms.

BRIDGE'PORT. A city, port of entry, and one of the county-seats of Fairfield County, Conn., on Bridgeport Harbor, an arm of Long Island Sound, at the mouth of the Pequonnock River, 18 miles southwest of New Haven, 56 miles northeast of New York (Map: Connecticut, C 5). It has railroad connections by the New York, New Haven and Hartford and its branches, and steamboats run daily to New York. The city is built mainly on level ground, and occupies an area of about 15 square miles. The elevated section, Golden Hill, affords fine views of the Sound and shore, and is covered with beautiful residences. Black Rock, which forms part of Bridgeport, is a summer resort, its harbor being a popular anchorage ground for yachts. The most notable buildings are the United States post-office and custom-house, the county court-house, the Barnum Memorial Institute, the Burroughs Public Library, the Sterling Widows' Home, the city hospital, and

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the Young Men's Christian Association Building. There are three fine parks, comprising about 250 acres: Beardsley, Washington, and Seaside; the last, situated on the shore with a sea-wall and a drive two miles long, contains a soldiers' monument, and statues of Elias Howe and P. T. Barnum. Extensive improvements have been recently undertaken in providing a new railroad depot, and in elevating the railroad-tracks, the project to require eventually the expenditure of about $3,000,000, a part of which is borne by the city.

Bridgeport is an important manufacturing city, and has considerable coasting trade, the harbor being safe and accessible for fairly large vessels. The principal articles manufactured are sewing-machines, corsets, coaches, locomobiles, plush goods, brass, iron, and steel goods, machinery, cartridges, ordnance, and hardware. Some of the factories are of vast size. The Wheeler & Wilson Sewing-Machine Works cover ten acres, and the Union Metallic Cartridge Company has one of the largest establishments in its line in the world.

The city government is vested in a mayor, elected every two years, a municipal council, and the usual administrative departments, all appointed by the executive, and all, excepting that of public works, where the power is given to a single head, governed by boards. The school board, consisting of twelve members, four elected each year for a term of three years, is chosen by popular election. The annual expenditures of the city amount to about $1,000,000, the main items of expense being $60,000 for the police department, $65,000 for the fire department, $55,000 for the street lighting, $60,000 for hospitals, asylums, and other charitable institutions, and $170,000 for schools. Population, in 1880, 27,643; in 1890, 48,866; in 1900, 70,996, including 22,300 persons of foreign birth and 1100 of negro descent.

Bridgeport, first settled in 1665, was known as Pequonnock, 1665-94; Fairfield Village, 1694-1701; and Stratfield, 1701-1800. Until incorporated as the Borough of Bridgeport in 1800, it formed part of Fairfield and of Stratford townships. In 1836 it became a city, and in 1870 it was enlarged by the addition of a part of Fairfield, and in 1899, of Summerfield and West Stratford. Consult Orcutt, *A History of the Old Town of Stratford and the City of Bridgeport* (New Haven, 1886).

BRIDG'ER'S PASS. An elevated defile in the Rocky Mountains, in southern Wyoming, through which the overland stages went before the opening of the Pacific Railroad. It is several miles long, and in most places has almost perpendicular side walls from 1000 to 2500 feet high.

BRIDGES, LAW RELATING TO. Legislative authority to erect a bridge is necessary in three cases: First, when toll is demanded for its use—the right to take toll being a franchise (q.v.), which cannot be claimed without express grant from the State; second, when the State owns the bed of the stream over which the bridge extends, as is the case in all public or navigable streams; third, when the structure interferes or threatens to interfere with navigation. In the last case the authority of our State governments is subject to the power given to Congress by the Federal Constitution to "regulate commerce with foreign nations, and among the several States." (Art. I., §8.) The States may authorize bridges over navigable streams, and may regulate their size, form, and manner of construction. Until Congress intervenes in such cases the power of the States is unlimited. When it does intervene, however, its will is supreme, and its legislation, within the limits of the constitutional grant, overrides that of any State. A bridge constructed over a navigable river in accordance with an act of Congress is a lawful structure, however much it may interfere with the public right of navigation. See NAVIGATION; WATERS.

BRIDG'ES, ROBERT (1844—). An English poet. He was educated at Eton and at Corpus Christi College, Oxford; studied medicine at Saint Bartholomew's Hospital, London; and held several important hospital appointments before his retirement (1882). Bridges has published eight plays and several volumes of verse, often privately printed. His choicest poems (with bibliography) have been reprinted in three volumes (London, 1898-1901). Late Victorian poetry probably has nothing better than *Prometheus; Achilles in Scyros;* and *Shorter Poems.* Bridges has also written on Milton and Keats. Especially noteworthy is his *Milton's Prosody* (Oxford, 1893), which has been enlarged and reprinted with an essay by W. J. Stone on "Classical Metres in English Verse" (Oxford, 1901).

BRIDGES, ROBERT (1858—). An American editor and author. He was born at Shippensburg, Pa., July 13, 1858. After graduating at Princeton, he became connected with the New York *Evening Post,* and in 1887 was made assistant editor of *Scribner's Magazine.* He is best known for the sprightly reviews which for many years he contributed to *Life* over the signature 'Droch.' He is also the author of poems and of two prose volumes: *Overheard in Arcady* (1894) and *Suppressed Chapters and Other Bookishness* (1895). His poems were collected in 1902 under the title *Bramble Brae.*

BRIDGES AND DOCKS, MILITARY. The principal types of military bridges for the passage of troops and their supplies are the pontoon or floating, the spar, the trestle, and the suspension bridge. In most cases they must be constructed rapidly, and of such materials as are available, there being usually little time for refined calculations and for procuring the most suitable materials. The sizes of the parts of a military bridge depend primarily, as in other engineering structures, on the loads to be carried. Only in special cases will the width differ much from 8 to 10 feet. This is ample to provide for the passage of infantry in fours, cavalry in half sections, and guns and wagons fully horsed. It is considered desirable that, in whatever formation the troops may pass, the structure should be made strong enough to sustain them when crowded as a result of some stoppage in that portion of the column which has already crossed. In most cases 100 pounds to the square foot may be taken as the uniform weight for which a bridge intended for the passage of infantry should be made safe. If proportioned for this load, it will also be strong enough for the passage of the various train wagons and of field guns and carriages. If, however, it is to be crossed by steam-trac-

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tion engines or other unusually heavy loads, additional precautions may be necessary to enable it to carry them with safety.

In the United States Army, where the pontoon bridge was extensively and effectively employed during the Civil War, the bridge material of the Corps of Engineers is included in reserve and advance-guard trains. Where a large army is operating in the field and wide and swiftly flowing rivers are to be crossed the reserve train must accompany the troops. Such a train is divided into four pontoon divisions and one supply division. Each pontoon division is complete in itself, containing all the material necessary for constructing a bridge 225 feet in length. Each division is divided into four sections—two pontoon and two abutment sections—each pontoon section consisting of three pontoon-wagons and one chess-wagon. These four wagons contain the material for three bays (or 60 feet) of the bridge. If it is desired to vary the length of a single division, it can be done by diminishing or increasing the number of pontoon sections in the train. The pontoons are flat-bottom boats 31 feet in length, and with a maximum breadth of 5 feet 8 inches, of about 9½ tons burden, and with sufficient capacity to transfer 40 men fully armed and equipped, besides its crew of pontoniers.

Pontoon bridges may be constructed either by the method of successive pontoons, by rafts, or by conversion. The first mentioned is the most usual method. In following it, the pontoons are placed 20 feet apart, at right angles to the axis of a bridge, and anchored up-stream and down-stream to hold them in position. Five lines of floor-beams, known technically as 'balks,' 5 inches square, rest on the pontoons and are firmly lashed to them. On these floor-planks, 1½ inches thick and known as chess, are laid; these are held in position by side rails lashed through notches in the chess to the balk beneath. The width of bridge between side rails, when finished, is 10 feet. Bridges of this type received the hardest kind of usage during the Civil War, and proved clearly their great value. In the month of February, 1862, a pontoon bridge composed of 60 boats of a reserve train was thrown across the Potomac at Harper's Ferry. The river was then a perfect torrent, the water being 15 feet above the summer level, and filled with drift-wood and floating ice. Under these unfavorable circumstances, the bridge was completed in eight hours, and General Banks's corps, with all its trains and artillery, passed over it without accident or delay.

During the year of 1863 the pontoon trains accompanied the army in all its marches through Virginia, frequently bridging the Potomac, Rapidan, and Rappahannock.

The headquarters train in 1864 was followed by an advance-guard (q.v.) train, which, when a crossing was to be made by surprise, was sent forward with the cavalry to cover the construction of the bridge and hold the position until the main body arrived.

The advance-guard equipment is similar, in general principles, to the reserve. The pontoon, however, instead of being made entirely of wood, is made of canvas held in shape by wooden frames, which can be knocked down for transportation. For transportation purposes, the material is so packed that the pontoon-wagon contains all the materials for a single bay of 20 feet. The division may, therefore, be increased or diminished by one or more pontoon-wagons, if it is desired to increase or diminish the length of the bridge in units of 20 feet. The width of the bridge is two feet less than that of the wooden pontoon bridge. The canvas pontoon, while possessing the advantage over the wooden pontoon of being more easily transported, will of course not stand as hard service. At the same time, it has shown its usefulness on many occasions. The pontoon-trains with the Army of the Cumberland, in its march from Chattanooga to Atlanta, Savannah, and Washington, in the latter part of the Civil War, were of canvas, and gave excellent satisfaction. Where pontoon bridges are constructed at night, with a view to making a passage and surprising the enemy, the floor of the bridge should be covered with straw, in order to reduce the noise of construction to a minimum. Many substitutes for pontoons, such as floating supports, have been devised. Among the more important are rafts made of casks lashed to frames, rafts of timber, and boats of commerce.

Spar bridges are made with round timber usually cut near the site of the bridge. For narrower spaces of 25 feet or less, the balks consist of single trees stretching across the river. The roadway is made of small saplings smoothed off on top or covered with dirt. For spaces of 30 to 35 feet, two trapezoidal frames are constructed of timbers lashed together and braced by diagonal braces lashed to the legs of the frame. These are put in position on the opposite banks, and then lowered so as to rest their tops on each other and form an intermediate support above the middle of the stream for the balk or roadway-bearers. For a still wider stream, double-lock bridges can be used. In these the frames, instead of resting on each other, rest on cross-timbers held apart by straining beams. These cross-timbers furnish two intermediate supports over the gap for the balk. For still wider openings, the frames are made considerably longer, so that they support each other at a point not less than 10 feet above the roadway. From their junction an additional roadway-bearer is suspended by ropes. This, together with the points where the roadway crosses the two frames, gives three points of support.

One of the most generally useful of all the types of bridge is the trestle bridge. Vertical frames are constructed, on which the balks carrying the roadway are placed. In cases where a single trestle is not high enough to come from the bottom of the gap to the desired height of roadway, trestles can be so braced that they will hold others on top of them. This type of bridge particularly lends itself to railroad work, one of the most notable examples of the kind being the bridge across the Potomac Creek, Va., during the Civil War. This bridge was 80 feet high and 400 feet long.

Suspension bridges have not been of general application in the United States military service. The English have made some use of them. They are suitable for wide spans, where it is difficult to secure intermediate supports. An army traveling in a country where its service will probably require the construction of this type of bridge should make provision for

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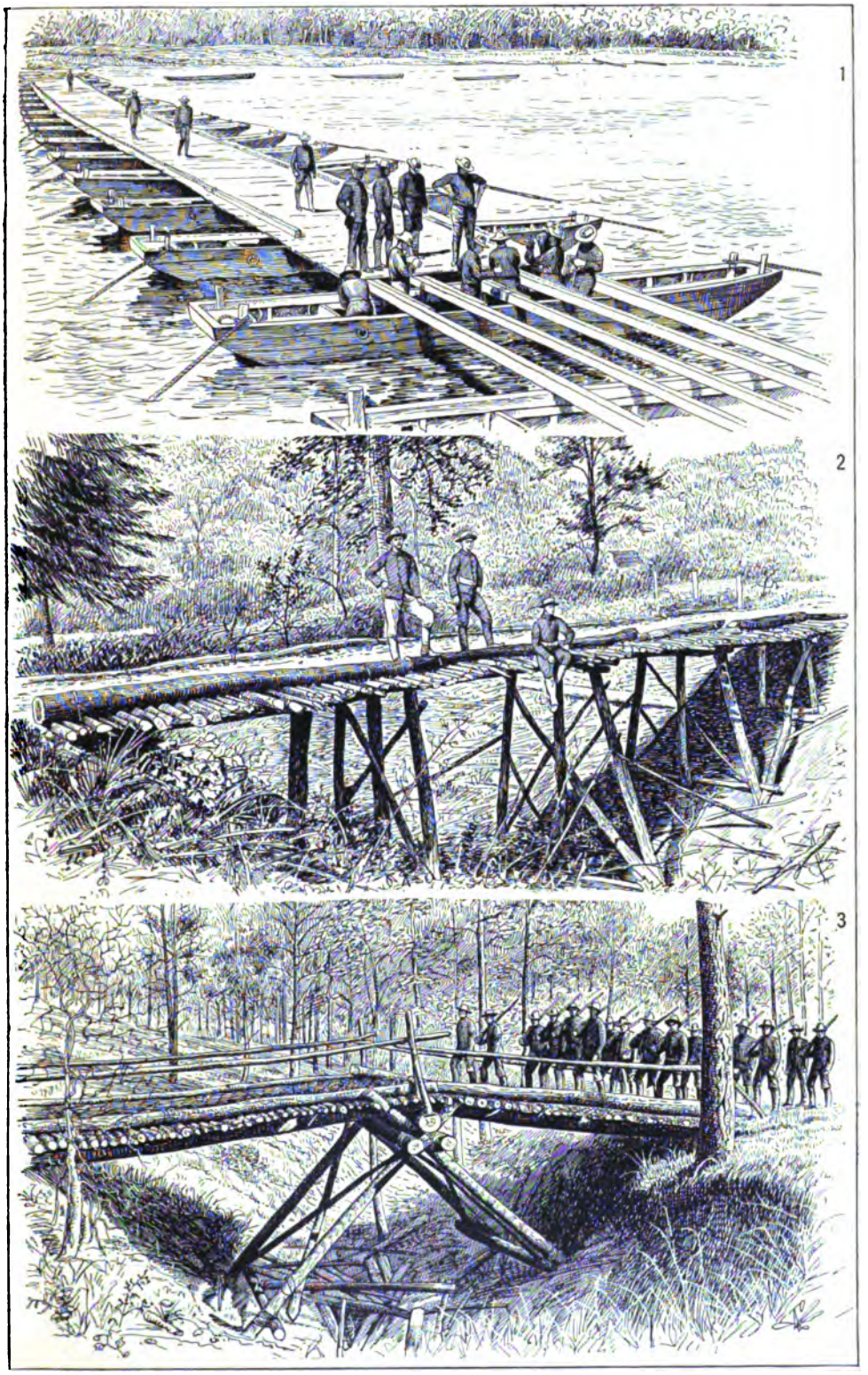
MILITARY BRIDGES



1. PONTOON BRIDGE.

2. SPAR TRESTLE BRIDGE.

3. SPAR BRIDGE.

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carrying along the necessary wire cables, clips, and ropes. A bridge with a span of 100 feet can be constructed with such material, having a roadway 5 feet 8 inches wide in the clear. With a load of infantry in file crowded, the bridge has a stress of about 63,000 pounds in the cables and on the anchorages.

The type of bridge to be used in a given case depends on many circumstances. An army starting out for extended service in a country such as that covered by many of the operations of the Army of the Potomac in the Civil War—that is, rather a low, flat country, with many broad streams—would naturally provide itself with pontoon bridges, and, having them, would use this type wherever practicable. On the other hand, as the pontoon bridge must be near the surface of the water, it is not well adapted for use in a country where the streams are narrow and the banks so high that trouble would be experienced in the construction of approaches leading to the ends of the bridge. An army expecting to operate in a country provided with poor roads, but fairly well wooded, and having streams not too deep to permit of the establishment of cribs and trestles, might well rely on the trestle-and-spar bridge. If operating in a mountainous country, cut up by gorges and canyons and poorly provided with roads, it should carry the necessary cables, etc., for constructing suspension bridges over gaps too wide for spar bridges. Bridges have been constructed across streams just too deep for fording by running in wagons and laying the balks and roadway on top of them. Railroad bridges can be utilized for the passage of troops on foot and wagons by planking over the ties and sometimes covering with dirt. In many cases no bridge will be needed. In cold weather the ice may be sufficiently thick to permit the crossing of an army. Six inches of good ice will suffice for the passage of the usual loads accompanying an army; 2 inches permits the passage of infantry in single file on planks; 10 to 12 inches bears the heaviest loads of an army. In other cases, as in the famous passage of the Delaware by Washington, the army may be ferried over in boats. A modification of this method, known as the method by raft, has also been used. Rafts with large deck-areas can be made with pontoons by lashing a number of the latter together and flooring them over with chess. On them men and horses can readily be ferried, while rafts of bamboo were used for transporting field artillery across rivers in the Philippines. A river of shallow depth and moderate current may be forded; where the depth is too great only for short distances, the level of the bottom at these places may be raised temporarily by throwing in brush, logs, and other material. There have also been instances in history of the successful swimming of rivers by small bodies of troops.

Temporary piers or docks are sometimes required to facilitate the landing of troops and material. Such structures are rarely made stronger than to permit small boats, such as launches and lighters, to lie alongside of them and unload. They consist essentially of a top floor and of supports, the relation between the floor and supports being similar to that existing in bridges. The supports are generally either trestles of some type, usually pile-driven, or log cribs sunk with stone. A pier-head may be extemporized by securely anchoring a pontoon raft.

For a comprehensive technical treatment of the subject of military bridges, consult: *The Chatham Manual of Military Engineering*, Part 3; *Military Bridging and Use of Spars* (London, 1894). An interesting chapter on the "Passage of Rivers" may be found in Fiebeger, *A Text-Book of Field Fortification* (New York, 1901).

BRID'GET, SAINT (1303-73) (more properly *Birgit* or *Brigitt*). A Roman Catholic saint. She was born in the Palace of Instad, near Upsala, the daughter of a prince of the blood royal of Sweden. In 1318 she married Ulf Gudmarsson, Prince of Nericia, a stripling of 18, by whom she had eight children, the youngest of whom, named Catherine (1336-81), became *par excellence* the female saint of Sweden. According to the legend, her husband and she vowed to spend the remainder of their lives in a state of continence, and, to obtain strength to carry out their resolution, made a pilgrimage to the shrine of Saint James at Santiago de Compostela, in Spain. This was between 1341 and 1343. On their return they entered the Cistercian Monastery of Alvastra, on the east shore of Lake Vettern, southwest of Stockholm. The picturesque ruins are still standing. There Ulf died in 1344, but without taking monastic vows. Bridget became a professed nun, and began to have revelations. She felt called upon to found a new order to the homage of the Saviour. This she did in 1346. The first monastery was at Vadstena, on Lake Vettern, only some 10 miles north, on the same side of Alvastra, and on her property. It is now a lunatic asylum. They received the rule of Saint Augustine, to which Saint Bridget herself added a few particulars, but constituted a new order — sometimes called the Order of Saint Bridget, sometimes the Order of Saint Salvator, or the Holy Saviour—which flourished in Sweden until 1595, when it was suppressed. In 1350 Saint Bridget went to Rome, where she founded a hospice for pilgrims and Swedish students, and obtained the Papal sanction for her order in 1370, which was reorganized by Leo X. After having made a pilgrimage to Palestine, she died in Rome on her return, July 23, 1373. Her bones were carried to Vadstena, and she herself was canonized in 1391 by Pope Boniface IX. Her festival is on the 8th of October. The *Revelationes Sanctæ Brigittæ*, written by her confessors, was keenly attacked by the celebrated Gerson, but obtained the approval of the Council of Basel, and has passed through many editions. Besides the *Revelations*, there have been attributed to this saint a sermon on the Virgin, and five discourses on the passion of Jesus Christ, preceded by an introduction which was condemned by the congregation of the *Index*. For her autobiography and the history of the order, consult: *Scriptures rerum Svecicaram mediævi*, Vol. III. (Stockholm, 1871-76); the English translation of her *Revelations* (London, 1873); also the biographies by G. Binder (Munich, 1891), and V. F. de Flavigny (Paris, 1892). The former treats also of her order. See BRIGITTINES.

Not to be confounded with this Swedish saint is another Saint Bridget, Saint Brigit, or Saint Bride, as she is more commonly called—a native of Ireland, born at Fochart, now Faugher, 47 miles north of Dublin, 453—the child of a man

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of royal race and his bond-servant. She was brought up by a wizard, who had bought her mother, and whom she converted to Christianity, but was liberated by the King. She became a nun and founded the Church and Monastery of Kildare (the Church of the Oak), and there died February 1, 523. She was unquestionably a woman of rare ability and consecration, and properly became, along with Patrick and Columba, one of the three great saints of Ireland. Her story, as told in Irish legends, is very attractive and based probably on facts. See it in Whitley Stokes, *Three Middle-Irish Homilies on the Lives of Saints Patrick, Brigit, and Columba* (Calcutta, 1877). She was renowned for her beauty. To escape the temptations to which this dangerous gift exposed her, as well as the offers of marriage with which she was annoyed, she prayed God to make her ugly. Her prayer was granted, and she retired from the world, founded the monastery already mentioned, and devoted herself to the education of young girls. Her day falls on the 1st of February. She was held in great reverence in Scotland, and was regarded by the Douglases as their tutelary saint.

BRIDGETON, brij'ton. A city, port of entry, and county-seat of Cumberland County, N. J., 38 miles south of Philadelphia, at the head of navigation on the Cohansey River, and on the New Jersey Central and the West Jersey and Seashore railroads (Map: New Jersey, B 5). It has manufactures of glass, gas-pipes, nails, castings, machinery, lumber, flour, oilcloth, and woolens. The canning of fruits and vegetables is carried on. Among its educational advantages are the South Jersey Institute, the West Jersey Academy, and Ivy Hall Seminary. Bridgeton has good transportation facilities, and the surrounding region is exceedingly fertile and well cultivated. Though settled long before the Revolution, Bridgeton was not incorporated until 1864. The government is administered under a charter of 1875, which provides for a mayor, elected every three years, and a city council. The mayor, with the consent of the council, appoints the five members of the board of assessors. The board of education is chosen by the council. The water-works are owned and operated by the municipality. Population, in 1890, 11,424; in 1900, 13,913.

BRIDGE'TOWN. The capital of the British West Indian island of Barbadoes, situated on the western coast, along the northeastern shore of Carlisle Bay (Map: West Indies, G 4). It has some trade and is the terminus of the only railway on the island. The town is the seat of Codrington College and of the Bishop of Barbadoes, and among its prominent structures are the Government buildings, the town hall, hospital, and the buildings of the garrison. Bridgetown was founded in the first half of the Seventeenth Century, and for some time was known as Indian Bridge. It has suffered severely from fires, notably in 1666, 1766, and 1845, and in 1831 it was visited by a disastrous hurricane. Population, over 21,000.

BRIDGE'WATER (from *Burgh-Walter*, the town of Walter Douay, its founder). A town and port of Somersetshire, England, on the Parret, 12 miles by river from the Bristol Channel, and 30 miles southwest of Bristol (Map: England, C 5). The town is chiefly built of brick. The Parret admits vessels of 700 tons up to the town; it rises 36 feet at springtides, and is subject to a tidal bore often detrimental to shipping. The town owns its water-supply and maintains public libraries and baths. Bath or scouring bricks, peculiar to Bridgewater, are made here of a mixture of sand and clay found in the river. There are also factories for the manufacture of iron and copper ware. Admiral Blake was a native of Bridgewater. Population, in 1891, 13,264; in 1901, 15,209. The town received its first charter from Edward I. It suffered severely in the Civil War, when it was taken in turn by both Royalists and Roundheads. Sedgemoor, the scene of the defeat of the Duke of Monmouth by the royal forces in 1685, lies a little to the southeast of the town.

BRIDGEWATER. A port of Lunenburg County, Nova Scotia, at the head of the La Have estuary, 12 miles west of Lunenburg (Map: Nova Scotia, E 5). Lumber constitutes its chief industry, and it contains the main offices of the Nova Scotia Central Railway. The neighborhood is resorted to for its excellent trout-fishing. The United States is represented by a consular agent. The town suffered from a destructive fire in 1899, which devastated the greater part. Population, 4000.

BRIDGEWATER. A town in Plymouth County, Mass., 27 miles south of Boston, on the New York, New Haven and Hartford Railroad (Map: Massachusetts, E 4). It contains ironworks, a foundry, a tack-factory, shoe-factory, brick-yards, and a cotton-gin factory. The town has a public library, and is the seat of a State normal school and of a State workhouse. The government is administered by town meetings, held annually. Population, in 1890, 4249; in 1900, 5806. Bridgewater, settled in 1645 as a plantation of Duxbury, was incorporated as a separate township in 1656, when its old name, Nuncketest, was discarded. It was one of the first towns to be settled in the interior of Massachusetts. Consult Orcutt, *History of New Milford and Bridgewater* (Hartford, 1882), and Mitchell, *History of Bridgewater* (Bridgewater, 1897).

BRIDGEWATER, Francis Egerton, third and last Duke of (1736-1803). An English canal-builder sometimes called the 'Father of British Inland Navigation.' He was the youngest son of Scroop, fourth Earl and first Duke of Bridgewater, and succeeded his elder brother, second Duke, in 1748. In 1758-60 he obtained acts of Parliament for making a navigable canal from Worsley to Salford, Lancashire, and carrying it over the Mersey and Irwell at Barton by an aqueduct 39 feet above the surface of the water, and 200 yards long, thus forming a communication between his coal-mines at Worsley and Manchester on one level. In this and his later great undertakings he was aided by the skill of James Brindley (q.v.), the celebrated engineer, and expended large sums of money. He was also a liberal promoter of the Grand Trunk Navigation; and the impulse he thus gave to the internal navigation of England led to the extension of the canal system throughout the kingdom.

BRIDGEWATER, Francis Henry Egerton, eighth Earl of (1756-1829). The son of John Egerton, Bishop of Durham, and grandnephew of the first Duke of Bridgewater. He was born in

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London, November 11, 1756, and succeeded his brother as Earl in 1823. He was educated at Oxford, becoming fellow of All Souls College, 1780. The same year he became prebendary of Durham, in 1781 rector of Middle, and in 1797 of Whitchurch, both in Shropshire, and he held these preferments till his death. He was prince of the Holy Roman Empire. He was very eccentric, for his home in Paris, where he lived the latter part of his life, was filled with cats and dogs, some dressed up as men and women, and he drove them out in his carriage and fed them at his table. When he died unmarried, in Paris, February 11, 1829, the title became extinct. By his last will, dated February 25, 1825, he left £8000, invested in the public funds, to be paid to the author of the best treatise *On the Power, Wisdom, and Goodness of God as Manifested in the Creation*, illustrating such work by such arguments as the variety and formation of God's creatures in the animal and vegetable and mineral kingdoms, the effect of digestion, the construction of the hand of man, and by discoveries, ancient and modern, in arts, sciences, and the whole extent of literature. The then president of the Royal Society of London, Davies Gilbert, to whom the selection of the author was left, with the advice of the Archbishop of Canterbury, the Bishop of London, and a noble friend of the deceased Earl, judiciously resolved that, instead of being given to one man for one work, the money should be allotted to eight different persons for eight separate treatises, though all connected with the same primary theme. (See BRIDGEWATER TREATISES.) He wrote himself a number of books, biographical, historical, and scientific. He left his manuscripts to the British Museum, with £12,000 to keep up the collection. The MSS. relate mostly to French and Italian history and literature.

BRIDGEWATER MADONNA, THE. A painting of the Virgin holding the Child in her lap, by Raphael (1512). It hangs in Bridgewater House, London.

BRIDGEWATER TREATISES. Eight celebrated works *On the Power, Wisdom, and Goodness of God*, by eight of the most eminent authors in their respective departments, published under a bequest of the last Earl of Bridgewater (q.v.), whereby each received £1000 with the copyright of his own treatise. They are Thomas Chalmers, *The Adaptation of External Nature to the Moral and Intellectual Constitution of Man* (London, 1833); William Prout, *Chemistry, Meteorology, and the Function of Digestion Considered with Reference to Natural Theology* (London, 1834); William Kirby, *History, Habits, and Instincts of Animals* (London, 1835); Buckland, *Geology and Mineralogy* (London, 1837); Charles Bell, *The Hand: Its Mechanism and Vital Endowments as Evincing Design* (London, 1837); John Kidd, *Adaptation of External Nature to Physical Condition of Man* (London, 1837); William Whewell, *Astronomy and General Physics Considered with Reference to Natural Theology* (London, 1839); Peter Mark Roget, *Animal and Vegetable Physiology Considered with Reference to Natural Theology* (London, 1840).

BRIDGMAN, ELIJAH COLEMAN (1801-61). An American missionary to China. He was born in Massachusetts, was a graduate of Amherst (1826) and of Andover (1829). He went as missionary to China in the year last named, and joined Dr. Morrison at Canton. Having learned to speak and write the Chinese language, he acted as official interpreter for the Imperial Commissioner Lin (1839), and afterwards as interpreter and secretary to the United States Minister, Caleb Cushing (1844). *The Chinese Repository*, a valuable magazine, was founded by him. In 1847 he established a mission station at Shanghai, where his version of the Bible was printed. His Chinese *Chrestomathy*, in the Canton dialect, a quarto of 734 pages, printed and contributed to by S. Wells Williams, was the first practical manual of the Cantonese dialect prepared in China. He died in 1861 at Shanghai, in the fullness of his powers.

BRIDGMAN, FREDERICK ARTHUR (1847—). An American painter. He was born at Tuskegee, Ala., November 10, 1847. From 1863 to 1866 he was a steel-engraver for the American Bank Note Company. In the latter year he went to Paris, where he studied under Gérôme. He went to Africa in 1872 and then became a painter of that region, following somewhat the subjects treated by his master, but with a more brilliant sense of color than Gérôme possessed. His first picture to attract notice was entitled "An American Circus in Normandy," in which characteristic American types in the performers were in interesting contrast to the French peasants who filled the seats. It was also more naïve in treatment than his later works, which showed greater skill and facility. His "Burial of a Mummy" took a prize at the Paris Exposition of 1878. He was appointed a Chevalier of the Legion of Honor, and a member of the National Academy of Design, New York, and of the Society of American Artists. He exhibited at the Paris Exposition of 1900 "Pharo" and "L'Arabe." Consult Muther, *History of Modern Painting* (London, 1896).

BRIDGMAN, HERBERT LAWRENCE (1844—). An American journalist and Arctic explorer. He was born at Amherst, Mass., graduated in 1866 at Amherst College, entered journalism, and became associate editor of the Brooklyn (N. Y.) *Standard-Union*. He accompanied and was historian of the Peary auxiliary expedition in 1894; in 1897 assisted Professor Libbey of Princeton University in scaling the Mesa Encantada ('Enchanted Mesa') of New Mexico; and in 1899 commanded the Peary auxiliary expedition on the steamship *Diana*.

BRIDGMAN, LAURA DEWEY (1829-89). A famous blind deaf-mute, born in Hanover, N. H., December 21, 1829. As the result of a violent fever, at the age of two, she lost sight, smell, and hearing. When she was eight years old, Dr. Howe, of Boston, undertook her education, and, after long and patient labor, succeeded in teaching her to read and write well, and to think clearly, so that she was later employed in teaching others. Consult Lampson, *Life and Education of Laura Dewey Bridgman* (Boston, 1878).

BRIDGNORTH (for *Brugge Morfe*, the bridge of the wood Morfe, on the opposite bank of the Severn). A town of Shropshire, England, on both sides of the Severn, 20 miles southeast of Shrewsbury (Map: England, D 4). It consists of an upper and a lower town connected by a bridge over the Severn. A tower, all that remains of the ancient Norman castle, stands on a rock 60

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feet above the river. There are two churches, and a town hall dating from 1852. The town owns its water and gas works, and maintains markets and a cemetery. It has an ancient Latin school, a mechanics' school, and a public library. Its industries include the manufacture of carpets and woolen goods. It is the birthplace of Bishop Percy, author of the *Reliques*. Population, in 1891, 5865; in 1901, 6049. The town, which was at one time called *Bruges* or *Brug*, is said to be of Saxon origin. In the beginning of the Twelfth Century, Robert de Belesme defended the town unsuccessfully against Henry I. It was besieged in the same century by Henry II.; and during the Civil War it was burned by the Parliamentary forces.

BRIDLE (from its similarity to the bridle of a horse). A chain or rope span, the ends being made fast and the power or weight between; the bowlines are attached to the sails in this way. The chains of permanent moorings, if the ends are attached to separate anchors, form a *mooring-bridle*, the vessel being made fast to the centre of the span.

BRIDLE AND BIT. See SADDLERY.

BRID'LINGTON, *local pron.* bûr'ling-ton, or BURLINGTON. A seacoast town in the East Riding of Yorkshire, England, six miles west of Flamborough head, 40 miles east-northeast of York (Map: England, F 2). Bridlington is situated on a gentle slope in a recess of a beautiful bay. It has the aspect of an old town with narrow, irregular streets. Bridlington is well known as a watering-place. It has an excellent harbor, carries on a considerable trade in grain and possesses an intermittent spring which supplies the town with fresh water. The town was incorporated in 1899. It has several schools and a library. Population, in 1891, 8919; in 1901, 12,473. Bridlington is noted for its chalk-flint fossils. Remains of Danish and Saxon times are found around Bridlington. After the Conquest, it became the site of a rich Augustine abbey, traces of which still exist in the parish church of Saint Mary. Consult Thompson, *Historical Sketches of Bridlington* (Bridlington, 1821).

BRIDOIE, brê'dwä'. A caricature on contemporary lawgivers, in Rabelais's *Gargantua and Pantagruel*. He decides all his cases by throwing dice.

BRIDOISON, brê'dwä'zôn'. A judge in Beaumarchais's *Le mariage de Figaro*, patterned after Bridoie in *Gargantua and Pantagruel*.

BRID'PORT. A seaport town of Dorsetshire, England, at the confluence of the Asker and Brit, two miles from the English Channel and 16 miles west-northwest of Dorsetshire (Map: England, D 6). Its public buildings include the fine parish church of Saint Mary, of the perpendicular period, a town hall, markets, mechanics' institute, and school of art. It has manufactures of ropes, cordage, sail-cloth, etc., and carries on some foreign and coasting trade. Bridport mint is mentioned in the *Domesday Book*. From Henry VIII. it received a monopoly of the cordage-supply for the British Navy. Population in 1891, 6611; in 1901, 5710.

BRIE, brê. An ancient district of France situated between the rivers Seine and Marne, now comprised in the departments of Aisne, Marne, and Seine-et-Marne. Its capital was Meaux. In olden times it was almost wholly covered by a forest. Subdued by the Franks, it formed, successively, part of the kingdom of Neustria and of the provinces of Champagne and Ile-de-France. It was ruled by its own counts until it became Crown property in 1361. Brie was, and is still, celebrated for its grain and dairy products, especially cheese.

BRIEF (OF., from Lat. *brevis*, brief). In the ancient law-writers, a writ or breve. Now, a concise and orderly statement of the points of law, pleadings, and evidence to be laid by one party to a cause before a court at its trial. The word is used in England and in the United States with very different meanings. In Great Britain it is the duty of the attorney (q.v.) or solicitor to prepare the case only—to draw up and serve papers, to marshal the evidence, to prepare the case for trial generally; and to the barrister is committed the task of arguing the case before the court, introducing the evidence, cross-examining, and taking entire conduct of the case in open court. A brief, under this English practice, is the concise statement of the case as it leaves the hands of the attorney, and it serves as a guide to the barrister and as his instructions for proceeding in open court. In the practice of courts in the United States, one person serves the office of both the English attorney and barrister. In our courts, accordingly, the brief is the abbreviated statement of pleadings, affidavits, evidence, and all points of law to be argued, prepared by the counsel for his own use, or to lay before the court as an assistance in following his presentation of the case. In appellate courts of the States, and in the United States courts, the brief is the skeleton or analysis of the argument prepared by the counsel, setting forth the legal propositions he offers, citing cases in support thereof, and indicating the rulings for which he argues. It is usual, and, indeed, in some States it is required by law, that such a brief should be printed and furnished to the court, to the official reporter, and to the opposing counsel. Consult the authorities referred to under PRACTICE.

The phrase *Brief of Title* is sometimes employed in place of the usual term *Abstract of Title* (q.v.), to denote the concise statement of the deeds, conveyances, and changes in ownership which may have occurred in the history of the title to a certain piece of real estate.

BRIEF, PAPAL (Lat. *brevis*, short; cf. Ger. *Brief*, a letter). A word used to denote certain letters of the Popes, which, however, do not receive their name from the brevity of the composition, but from the smallness of the calligraphy. The Papal brief differs from the Papal bull (q.v.) in several points. It gives decisions on matters of inferior importance, such as discipline, dispensations, release from vows, indulgences, etc., which do not necessarily require the deliberations of a conclave of cardinals. Still, it is not to be confounded with *motu proprio*, or private epistle of the Pope as an individual, as its contents are always of an official character, though expressing a kind of familiar parental authority, and the brief is consequently superscribed *Papa*, while the form of address is *dilecte fili* (beloved son). It is signed not by the Pope, but by the *segretario*

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de' brevi, an officer of the Papal chancery, with red wax, and only with the Pope's private seal, the fisherman's ring. Hence it concludes with the words *Datum Romæ sub annulo piscatoris* (given at Rome under the ring of the fisherman).

BRIEG, brēk (Slav. *Brĕgŭ*, bank). A town of Silesia, Prussia, situated on the left bank of the Oder, about 27 miles southeast of Breslau, on the railway line between Breslau and Vienna. (Map: Prussia, G 3). It was formerly surrounded by ramparts, which have been converted into promenades. The town is a manufacturing place of some consequence, and produces principally machines, textiles, cigars, and sugar. Population, in 1890, 20,154; in 1900, 24,114.

BRIEGER, brē'gĕr, JOHANN FRIEDRICH THEODOR (1842—). A German Protestant historian. He was born at Greifswald, June 4, 1842, studied there and at Erlangen and Tübingen, became professor of Church history at Marburg (1873) and at Leipzig (1886). He edits the *Zeitschrift für Kirchengeschichte* (Gotha), and has written principally upon the German Reformation. Among his works are *Quellen und Forschungen zur Geschichte der Reformation* (1884); *Die Theologischen Promotionen auf der Universität Leipzig 1428-1539* (1894).

BRIEGLEB, brēk'lāp, HANS KARL (1805-79). A German jurist, born in Bayreuth. He achieved distinction by establishing an historical basis for the theory of civil procedure. His investigations into the mediæval literature on this subject are also important. In addition to his principal work, *Ueber exekutorische Urkunden und Exekutivprozess* (2d ed. 1845), he wrote: *Summatim Cognoscere, Quid et Quale Fuerit apud Romanos* (1843); *Rechtsfälle zum akademischen Gebrauch* (1848-50); *Einleitung in die Theorie der summarischen Prozesse* (1859).

BRIEL, brēl, or **BRIELLE**, brē-ĕl', or THE BRILL. A fortified seaport town on the north side of the island of Voorne, in the Province of South Holland, Netherlands (Map: Netherlands, C 3). It is situated near the mouth of the Meuse, about 14 miles west of Rotterdam. Briel possesses a good harbor, and is intersected by several canals. It is a depot for military stores. The large Saint Catherine's Church contains the beautiful tomb of Admiral Philippus van Almonde. The town has some trade. Population, 4500. The seizure of Briel by the 'Beggars of the Sea,' under William de la Marck, April, 1572, opened the long struggle for independence waged by the Netherlands against Philip of Spain.

BRIENNE-LE-CHÂTEAU, brē-ĕn' le shā'tō' (Fr., Castle Brienne, anciently Lat. *Brienna*, capital of the *Brannovices*), or **BRIENNE-NAPOLEON**, -nā'pō'le-ōn'. A small town in the Department of Aube, France, on the right bank of the river Aube, about 14 miles northwest of Bar-sur-Aube. It is celebrated as the place where Napoleon I. received his earliest military education, entering the military school here in 1779, when he was 10 years old, and remaining until 1784. On January 29, 1814, Brienne-le-Château was the scene of a bloody and indecisive battle between the armies of Napoleon and Blücher. Consult Jaquot, *Notice historique sur Brienne* (Paris, 1832).

BRIENZ, brē-ĕnts'. A town of the Canton of Bern, Switzerland, beautifully situated at the foot of the Bernese Alps, on the northeast shore of the lake of the same name, and about 30 miles east-southeast of Bern (Map: Switzerland, C 2). The town is the centre of the Oberland woodcarving industry, and its cheese is held in high repute. Population, in 1900, 2600.

BRIENZ, LAKE OF. A lake in Switzerland, about 8 miles long and 2 miles broad, formed by the river Aare, at the foot of the Hasli Valley, and, through the same river, discharging its surplus waters into Lake Thun (Map: Switzerland, B 2). The lake is situated at an elevation of 1850 feet above the sea; its average depth is about 500 feet, but in some places it is said to have a depth of more than 900 feet. It is surrounded by elevated mountains, the principal one being the Rothhorn, from which splendid views of the whole range of the Bernese Alps are obtained. A small steamer plies daily on the lake between Brienz and Interlaken, touching at the celebrated Giessbach Fall on every trip.

BRI'ER CREEK. A stream in Warren County, Ga., at whose junction with the Savannah a force of about 1500 Americans (mostly militia), under General Ashe, was defeated by a somewhat larger British force, under General Prevost, on March 3, 1779. Of the British, only 5 were killed and 11 wounded; while of the Americans, 200 were killed or wounded, 200 were taken prisoners, and only about 450 reached the main army, the rest having retired to their homes. The victory restored Augusta to the British, and reinstated temporarily the royal government of Georgia.

BRI'ERLEY, BENJAMIN (1825-96). An English writer, born at Failsworth, Lancashire. After meagre schooling, he became a Manchester weaver, but read extensively in the English poets. It was after 1855 that he began to be known for his stories and verses of Lancashire, written, many in dialect, under the pseudonym of 'Ab-o'-th'-Yate,' and very accurate in point of local color. These include: *Tales and Sketches of Lancashire Life* (1863); *Irkdale* (1865); and *Ab-o'-th'-Yate in Yankee Land* (1887).

BRIERLEY HILL (*brier ley, lea*, field). A town of Staffordshire, England, 2 miles northnortheast of Stourbridge, on the Stour (Map: England, D 4). Large quantities of coal, iron, and fire-clay are found in the neighborhood, and its principal industries are connected with coalmines, iron-foundries, glass and pottery works, and brick-kilns. Population, in 1891, 11,831; in 1901, 12,040.

BRIERLY, BOB. The principal character in Tom Taylor's play *The Ticket-of-Leave Man*.

BRIERRE DE BOISMONT, brē'ār' de bwäs'mōn', ALEXANDRE JAQUES FRANÇOIS (1798-1881). A French physician and authority on insanity, born in Rouen. He took his degree in medicine in 1825, in which year he published his first work, *Eléments de botanique*. In 1831 he spent some months in Poland, studying the cholera, and upon his return published the results of his investigations in a treatise, which obtained for him a gold medal from the Institute. He then turned his attention to mental diseases, founding and maintaining an asylum for the treatment of the insane. His principal works

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are: *La pellagre et la folie pellagreuse* (1834); *La menstruation* (1842); *La délire aigu* (1844); *Les hallucinations* (1845); and *Le suicide* (1854).

BRIG, or **BRIG'ANTINE** (Fr. *brigantin*, It. *brigantino*, from *brigante*, pirate. *Brig* is the shortened form, just as *cab*, from *cabriolet*). A brig is a square-rigged vessel with two masts. An *hermaphrodite brig* is a two-masted vessel, with the mainmast of a schooner and the foremast of a brig. A brig's mainsail is the lowest squaresail on the mainmast, whereas the mainsail of a brigantine is a fore-and-aft sail like that of a schooner. Aside from its mainsail a brigantine is like a brig.

BRIG. A town in the Canton of Valais, Switzerland, on the Rhone, 17 miles east of Leuk. It is situated at the foot of the Simplon Pass, 1½ miles above the north end of the Simplon Tunnel, and commands a view of magnificent mountain scenery. It has an ancient Jesuit monastery, and the Sixteenth-Century Stockhalper Castle, the master of which controlled and protected the trade over the Simplon. Population, in 1900, 2198.

BRIGADE (Fr., It. *brigata*, company, from *brigare*, to strive, *briga*, strife). A number of regiments, battalions, or corps of any arm of the service combined in one group and under one general command. The system of grouping battalions and regiments into brigades was first introduced by the great generals of France in the reign of Louis XIV. (1642-1715)—Turenne, Condé, and others; and in England by Marlborough. The idea was soon imitated by every army in Europe, the rule generally being to group together regiments of infantry of two or three battalions, each battalion 500 or 600 strong, and regiments of cavalry of four squadrons, each having a strength of from 100 to 150. Artillery was not as yet prepared for this form of organization, as most of the guns were attached to the regiments. The organization of the army as a whole is the factor which determines the character and strength of component parts in times of peace; alterations made in the field are usually to facilitate command, to insure greater mobility and better adaptation to the circumstances with which the army as a whole is confronted. In the United States a brigade may consist of either infantry, cavalry, or artillery, under the command of a brigadier-general. There are usually three regiments in a brigade, though the number may be greater or less. In England the strength of a brigade varies with the circumstances under and for which it is formed. It has no arbitrary strength or place in the organization of the army. In Continental European armies two regiments is the average strength in time of peace, varying according to circumstance in time of war. See ARMY ORGANIZATION.

BRIGADE MAJOR. See ADJUTANT.

BRIGADIER-GENERAL (Fr., from *brigade*). In the United States Army, the rank appropriate to the officer commanding a brigade (q.v.). The rank is intermediate between that of colonel and major-general. In the English and European armies generally, the brigade commander is usually a colonel or lieutenant-colonel, who for a brief period or for some particular service, and largely because of his seniority, is placed upon brigade duties. The brigade almost invariably contains the brigadier-general's own regiment. See RANK AND COMMAND.

BRIG'ANDAGE (Fr., OF. *brigand*, a foot-soldier, brigand, from It. *briga*, strife). The system of robbery practiced by armed men, or bands of armed men, on the highways, in the mountains, or in waste places. At the dawn of history violence was the natural stage, and since the beginning of civilization brigandage has prevailed wherever natural, political, and economic conditions have united to make peaceful pursuits difficult and unremunerative, and plunder profitable. Given a country of mountains, desert, or marshes, a poverty-stricken peasantry oppressed by alien masters, a period of civil war and anarchy, and brigandage is sure to spring up. Countries like Arabia, where man has in great part remained in a state of nature, are still the homes of bands, or even clans and entire nations of robbers. To this day, undoubtedly, in the wastes of the Arabian Peninsula, representatives may be found of the classic Ishmaelite marauder, whose inborn talent enabled him to cut a throat, steal a head of cattle, or dash off a ballad with equal grace and dexterity. In ancient Greece, too, highway robbery flourished as a survival of prehistoric times. One of Theseus's great labors was clearing the Corinthian Isthmus of the brigands that infested it. When Telemachus in the *Odyssey* inquires of his guest, Mentor, whether he is a pirate or engaged in some other occupation, the deduction would be that, in heroic times, pillaging was considered a conservative profession. In distinction from his forefathers, the modern Greek bandit is the product of just such conditions as have been pronounced favorable to the growth of outlawry. Greece before 1827 presented the spectacle of a country impoverished by the anarchic rule of the Turk. The mountains and ravines of Hellas became the home of the Greek *Klephts*, who were raised above the common level of brigands by the national spirit which at times animated them. Frequently they ceased to be bandits to become heroes. The names of Marco Bozzaris, Colocotronis, and other leaders of the Klephts are well known in connection with the Greek War of Liberation.

Rome was founded by outlaws, and during the social and civil wars the Italian Peninsula was a stamping-ground for bands of renegade soldiers, runaway slaves, and gladiators, who were often bold enough to enter the suburbs and towns, plundering tombs and deserted houses, kidnapping and assassinating for pay. The spurs of the Apennines and the marshes of the Campagna afforded them safe retreats and admirable centres of operation. The splendid military roads of Rome were not safe from them.

Britain had her Hereward (c.1060) and her Robin Hood (c.1170), with his Merry Men of Sherwood, the last champions of Saxon England against the Norman. The clearing of the forests, the draining of the fens, the repression of the lawless barons by the Crown, made systematic brigandage impossible. Though it flourished in Scotland, in Wales, and on the border, the craft died out in England. Jack Sheppard (1702-24) and Dick Turpin (died 1739) are brilliant but solitary phenomena. France, likewise, was too firmly governed after 1600 to suffer the existence

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of powerful robbers, though the country had been devastated by them during the Hundred Years' War and the Civil wars. Still, France may boast of two great names in modern times: Cartouche (1693-1721), who terrorized Paris for a long period, and Mandrin (1724-55), whose sphere of operations lay south of the Loire, and chiefly in Languedoc. The robber barons of Germany are historic. They swarmed in the southwestern part of the country, on the Rhine, and in what is now Bavaria, Württemberg, and Baden. The great cities of Southern Germany, Nuremberg, and Augsburg especially, suffered greatly from their depredations, and carried on feuds with them. Maximilian I. (died 1519) did much to crush out these predatory knights by putting them under the ban, and proclaiming a general peace for the Empire. They disappeared before the power of the consolidated principalities after the Thirty Years' War. About the time of the French Revolution, Johann Bückler, apprenticed to a hangman, ran away and set up for himself as brigand, in the Rhine Provinces. 'Schinderhannes,' as he was generally called, was absolutely fearless, and frequently captured bands of travelers single-handed, though he commanded more than a hundred men. He was executed at Metz, in 1803. Spain has always been a land of outlaws. The system of imposing extravagant imposts on foreign and domestic trade, which has always been followed, made smuggling immensely profitable, and the country was consequently filled with bands of contrabandists, who plundered and murdered when they could not smuggle. From 1808 to 1876, moreover, Spain was at various times the scene of guerrilla warfare; the nation against Napoleon, Liberals against Absolutists, and Cristinos against Carlists. In such stormy times freebooters naturally throve. The most famous of Spanish outlaws is probably Don José María, best known, no doubt, as the hero of Prosper Mérimée's *Carmen*.

Italy, in modern times, has been the stronghold of brigandage, because the conditions necessary for the existence of brigandage have prevailed there in the most developed form. During four hundred years the country served as a toy for European nations, and was repeatedly torn up and patched together to suit the designs of European diplomacy. In Southern Italy especially, the people were reduced to misery, deprived of all semblance of wise and stable government, and subjected to foreign masters. Naples was a flourishing country in the Sixteenth Century when Spain took possession of it. Spanish tyranny and maladministration crippled the country's resources, stifled its political life, and drove its bold and active spirits to the mountains. The period of the French Revolution was the golden age of brigandage, when Italy supplied the world with its most daring criminals, and operatic composers with picturesque subjects for their librettos. Then rose Fra Diavolo (q.v.), bandit and monk, hanged in 1806 by the French, against whom he maintained the cause of the Bourbons; Peter of Calabria (c.1810), who proclaimed himself 'Emperor of the mountains, King of the forests, Protector of the highways'; the priest, Cirro Annochiariso, who said to the Father who came to give him absolution before his execution for numerous bloody crimes, "No tomfoolery. We are both in the business"; Marco Sciovo; Crocco; and many others. The Bourbon uprising in 1860 filled Southern Italy with armed bands of partisans, who degenerated into banditti, and were stamped out only after hard campaigning. The peninsula of Italy is at present almost cleansed of the pest; but in Sicily it rages as violently as ever. The Sicilian outlaws hold the country in subjugation, and live in open alliance with the peasantry and the officials. In Sicily, too, the evil of secret societies is prominent, the Mafia finding its home there. The Mafia dates back to the time of the Norman invaders, when the enslaved people were ruled by the foreign barons, who neither granted them justice nor afforded them protection. A state of things which made possible a murderous uprising like the Sicilian Vespers (q.v.) brought about the formation of secret societies among the peasants, organized for their mutual protection. Knowing what justice they were likely to obtain in the lord's court, they pledged themselves never to appeal to the authorities, but to leave all causes to be decided by the society. Continued misgovernment confirmed the peasant in his views, and to the present day he regards all authority and the machinery of government with distrust, and looks upon the Mafia as a national institution, and upon the brigands as victims of oppression. The fact that the society has lost its original character, and that the brigands are mere criminals, does not prevent the Sicilian from holding secret obedience to the one, and paying tribute to the other.

Other nations have had, and still have, their bandits. The Kabyles of the Atlas Mountains, the Kurds of Armenia, and the Hill-men of Afghanistan and India are subjects of contemporary interest. Russia, in the Seventeenth Century, brought forth a great brigand—Stenko Riazin, a Cossack, who ravaged the valleys of the Don and the Volga and the shores of the Caspian. In 1670 he headed an insurrection of the serfs in Southeastern Russia, took the towns of Astrakhan, Saratov, and Samara, and devastated the country around Nijni-Novgorod and Tambov. He was defeated in 1671, captured, and executed.

The type of brigandage combining patriotism with plunder as practiced in the Balkan States received a remarkable illustration in the last part of 1901 and the spring of 1902. On September 3, 1901, as Miss Ellen M. Stone, a missionary at Bansko, in Macedonia, was traveling through the mountains, accompanied by a native woman and an escort of seven men, the party was attacked by brigands, and Miss Stone and her companion, Madame Tsilka, were carried off, while the others were sent on to Samokov to tell of the capture, and to state that a ransom of $110,000 was demanded for the release of the women. It soon became evident that the party which had captured Miss Stone were no mere brigands, but were acting as the agents of the Macedonian Committee, whose object is to free their country from the Turkish rule, and who resorted to this means to secure the funds necessary for carrying on their agitation. Efforts to run down the brigands proved fruitless, and finally the United States Government was forced to treat with them through its diplomatic representatives in Turkey. On February 6 a ransom of $72,000 was paid, and on February 23 Miss Stone and her companion were set at liberty near

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Strumitza, not far from the place where they had been captured. The good character of the brigands was attested by the released women, who declared that they had been treated with all kindness and consideration consistent with the relation of captors and prisoners.

Of the United States and of its road-agents and train-robbers, little need be said. Though fast dying out, the race still exists in the West. The memory of the most famous of American brigands, Jesse James, is still fresh in the minds of men. Consult Nicotri, *Mafia e brigantaggio in Sicilia* (Rome, 1900).

BRIG'ANDINE, or **BRIG'ANTINE** (from *brigand*, a foot-soldier; later brigand). In mediæval armor, an assemblage of small plates of iron, sewed upon quilted linen or leather, and covered with a similar substance forming a sort of coat or tunic. It was lighter than the corselet, more effective than the hauberk, and cheaper than either, so that it came into common use. The brigandine was named from the brigands, a light-armed, irregular soldiery of the Fourteenth and Fifteenth centuries, resembling the Turkish Kurds and Bashi-bazuks of recent days, and, like them, addicted to marauding and pilfering; hence the English word brigand.

BRIGGS, Charles Augustus (1841—). An American theologian. He was born in New York City, January 15, 1841; studied at University of Virginia, graduated at Union Theological Seminary, New York, 1863; studied at University of Berlin, Prussia, 1866-69, and was ordained (Presbyterian) 1870. He was pastor at Roselle, N. J., from 1870 to 1874; professor of Hebrew and cognate languages in Union Theological Seminary, New York, 1874-91, and has since been professor of biblical theology in the same institution. His inaugural address on taking this latter chair (January 20, 1891), on *The Authority of the Holy Scriptures*, contained statements respecting the Bible, inspiration, and the place of reason in religion which were the subject of charges for heresy before the Presbytery of New York; which, however, after a six weeks' trial, acquitted him (December, 1892). Those who were dissatisfied with this verdict brought his case before the General Assembly of the Presbyterian Church in May, 1893, and by that body he was suspended from the ministry, but the Seminary refused to remove him. He entered the ministry of the Protestant Episcopal Church in 1897. He is the author of *Biblical Study* (1883), enlarged and rewritten, and entitled *General Introduction to the Study of Holy Scripture* (1899); *American Presbyterianism: Its Origin and Early History* (to 1775); together with an appendix of letters and documents which have recently been discovered (1885) — an exceptionally important volume, showing the author's capacity for original historical research; *Messianic Prophecy: A Study of the Messianic Passages of the Old Testament* (1886); *Whither? A Theological Question for the Times* (1889); *The Bible, the Church, and the Reason* (1892); *The Higher Criticism of the Hexateuch* (1893); *The Messiah and the Gospels* (1894); *The Messiah of the Apostles* (1895).

BRIGGS, Charles Frederick (1804-77). An American journalist and author, well known under the pseudonym of 'Harry Franco.' He was born at Nantucket, Mass. In 1844 he started at New York the *Broadway Journal*, of which, the following year, Edgar Allan Poe became associate editor. His next important editorial work was on *Putnam's Magazine* (1853-56) in connection with George William Curtis and Parke Godwin. Later he served on the *Times*, the *Evening Mirror*, the *Brooklyn Union*, and, finally, the *Independent*. His *Harry Franco: A Tale of the Great Panic* (1839) was followed by a series of works dealing more or less humorously with life in New York City. Selections from his occasional verses appeared in *Seaweeds from the Shores of Nantucket* (1853). Briggs is quite frequently mentioned in Lowell's early correspondence.

BRIGGS, George Nixon (1796-1861). An American politician, Governor of Massachusetts from 1844 to 1851. He was born in Adams, Mass., was admitted to the bar in 1818, and soon attained great prominence as a criminal lawyer. He served in Congress from 1831 to 1843. He was subsequently a judge of the Common Pleas (1851-56); was one of the founders of the Republican Party in his State, and for sixteen years was a trustee of Williams College. Consult Richards, *Great in Goodness* (Boston, 1866).

BRIGGS, Henry (1561-1631). An English mathematician, born at Warley Wood, in Yorkshire. He received his education at Cambridge, where he became examiner and lecturer in 1592. In 1596 he was made professor of geometry in the newly founded Gresham College, London, and in 1619 was invited to fill the chair of astronomy at Oxford, but resigned this position in 1620. Briggs made a number of interesting contributions to mathematics and astronomy, but he is justly celebrated for his invention of the ordinary decimal system of logarithms. In 1616 he went to Scotland to see Napier, with whom the general idea of logarithms had originated some time previously. "My Lord," he said to Napier, "I have undertaken this journey purposely to see your person, and to know by what engine of wit or ingenuity you came first to think of this most excellent help unto astronomy, viz. the logarithms; but, my Lord, being by you found out, I wonder nobody else found it out before, when now known it is so easy." (Lilly, *History of His Life and Times.*) Briggs devoted many years of his life to the calculation of logarithmic tables, his system being still known as Briggs's Logarithms. His published works include: *Logarithmorum chilias prima* (1617); *Lucubrationes et annotationes in Opera posthuma J. Neperi* (1619); *Arithmetica Logarithmica* (1624); *Trigonometria Britannica* (1633). See Logarithms.

BRIGHAM, brig'am. A city and county-seat of Box Elder County, Utah, 20 miles north of Ogden, on the Oregon Short Line, and near the Southern Pacific Railroad (Map: Utah, B 1). It contains a public library. The city is engaged principally in fruit-growing and general agriculture, though there are a woolen-mill, tannery, planing-mill, and lumber-yards. The waterworks are owned and operated by the municipality. Population, in 1890, 2139; in 1900, 2859.

BRIGHAM, Amariah (1798-1849). An American physician, who devoted much attention to the study of insanity. He was born in New Marlborough, Mass., and was eminent as a physi-

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cian in that State and at Hartford, Conn., where he became superintendent of the retreat for the insane in 1840. Two years later he accepted a similar post at the New York State Asylum in Utica, N. Y. Dr. Brigham regarded infant schools and religious revivals as frequent inducers of insanity, and published his views in *Influence of Mental Cultivation on the Health* (1832), and *Influence of Religion Upon the Health and Physical Welfare of Mankind* (1835). He also established the *Journal of Insanity*, and published *Diseases of the Brain* (1836).

BRIGHELLA, brē-gĕl'lȧ (It., dim. of *briga*, strife, quarrel, brawl). A rustic clown; one of the conventional types in old Italian comedy.

BRIG'HOUSE. A town in the West Riding of Yorkshire, England, on the Calder, about three miles east-southeast of Halifax (Map: England, E 3). It is composed of the districts of Brighouse, Rastrick, and Hove Edge, which were incorporated in 1893 as a borough. Its water is supplied by the corporation of Halifax. The town owns gas and electric-light plants, markets, and cemeteries. Its industries consist of the manufacture of woolen, cotton, and silk fabrics. There are also machine-works and stone-quarries. Population, in 1891, 20,666; in 1901, 21,735. Consult Turner, *History of Brighouse* (Bingley, 1893).

BRIGHT, Sir CHARLES TILSTON (1832-88). An English engineer, born at Wanstead. In 1852 he became connected, in the service of the Magnetic Company, with the laying of underground systems of land telegraphy. He took out patents on telegraphic apparatus, and in 1856 was appointed engineer-in-chief to the Atlantic Cable Company. After two failures, he at length succeeded, on August 5, 1858, in laying the 2050 miles of cable connecting Ireland and Newfoundland. He was thus the first to establish communication by telegraph between America and Europe. Subsequently he was employed in the laying of cables in the Mediterranean Sea, in the Persian Gulf, and among the West Indies. From 1865 to 1868 he represented Greenwich in Parliament as a Liberal, and in 1886-87 was president of the Institute of Electrical Engineers. With Latimer Clark he invented a method for the application of a composition of asphalt as a coating for the exterior of submarine cables.

BRIGHT, JAMES FRANCK (1832—). An English scholar, educator, and author. He was born at Saint James's, Westminster, graduated in 1855 at University College, Oxford, and from 1856 to 1872 was an assistant master at Marlborough College, of whose modern department he was the head. In 1872 he became tutor and lecturer in modern history and divinity at Balliol, and lecturer in modern history at University College. Of the latter, he was in 1874 appointed dean, and in 1881 master. He has repeatedly been examiner in history at the university. He has published a text-book, *History of England from 449 to 1880* (4 vols., 1880-88), and Lives of Joseph II. and Maria Theresa, both in 1897.

BRIGHT, JESSE D. (1812-75). An American politician. He was born in Norwich, N. Y., but removed with his parents to Indiana in 1820; was admitted to the bar in 1831, and was successively a member of the State Legislature, Lieutenant-Governor of the State, and United States Marshal. In 1845 he was elected to the United States Senate, and thereafter, on several occasions, was chosen as its president *pro tem.* He was an enthusiastic Democrat, and in all sectional disputes consistently voted with the South against the North. In 1862 the Republicans brought against him a charge of disloyalty, which was based largely on his having written to 'His Excellency Jefferson Davis, President of the Confederation of States,' a letter introducing a friend who had an 'improvement in firearms' to dispose of; and though the Judiciary Committee decided that such evidence as had been adduced was insufficient for conviction, nevertheless he was expelled from the Senate by a vote of 38 to 14. He subsequently went to Kentucky, where he was elected to the State Legislature, and in 1874 he removed to Baltimore, Md.

BRIGHT, JOHN (1811-89). An English statesman and orator. He was the son of Jacob Bright, a Quaker cotton spinner and manufacturer at Rochdale, Lancashire, and was born at Greenbank, near that town, November 16, 1822. Young Bright's education was of a fitful and elementary character, and the magnificent attainments which he displayed in later life must be ascribed entirely to native talent and to indefatigable industry. At the age of fifteen he entered his father's business, but devoted himself at the same time to the study of public oratory, which seems to have attracted him at a very early period. In 1835 he made a foreign tour, which included a journey to Palestine. On his return he delivered a number of lectures on the subject of his travels and on topics connected with commerce and political economy before the Literary Society of Rochdale, of which he was one of the founders. His attention was first drawn to the subject of the Corn Laws, with which he was to be so prominently identified, by an attack on the evils of the factory system—in answering which, Bright pointed out that the lamentable condition of the Lancashire mill-operatives was due in very great measure to the iniquitous Corn Laws, which made food so dear in times of scarcity. In 1839 he was one of the founders of the first Anti-Corn Law Association at Manchester, at which time he made the acquaintance of Richard Cobden, with whom he lived in close friendship till the latter's death. Bright, however, did not actively enter into the Anti-Corn Law agitation until 1841; but from that time until the repeal of the laws in 1846, he and Cobden were the most prominent leaders of the movement; and Bright continued, by the side of Cobden, to be one of the chief pillars of the general system of free trade, which obtained such complete ascendency in England. Bright's power consisted in his talent for forceful presentation, which made him an excellent popular exponent of the principles formulated by finer thinkers, like Cobden. In 1843 Bright was elected to Parliament from Durham, and four years later from the factory town of Manchester, for by this time he had come to be regarded as one of the leaders of English workingmen. After 1857 he sat for Birmingham. In Parliament, Bright, though initiating no important measures of legislation himself, exercised a very powerful influence on the most important features of Imperial policy. He showed himself an ardent champion of the rights of the people of India; in their defense he antagonized the East India Company, and he

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was largely instrumental in bringing India under the direct control of the Crown. He also lent much attention to the Irish question. He was a warm advocate of the disestablishment of the Irish Church, and to the end of his life was interested in the various Irish land-measures. He remained a leader of the democracy throughout his life, playing a great part in the movement which led to the Reform Bill of 1867, and, in a somewhat less degree, in the agitation preceding the County Franchise Bill of 1884. He held office under Gladstone as president of the board of trade from 1868 to 1870, and as chancellor of the Duchy of Lancashire from 1873 to 1874 and from 1880 to 1882. In 1883 he was made Lord Rector of Glasgow University. He died March 27, 1889.

The enormous influence which Bright exercised on English politics and public opinion during the greater part of his life was due in less measure to his intellectual attainments than to his great moral strength. Aside from the gift of oratory, which, according to competent critics, he possessed to a degree unequaled by any other English statesman of the Nineteenth Century, Bright impressed himself upon Parliament, and more than that, upon the people at large by the intense earnestness, the hatred of injustice, and the disinterested sympathy for the oppressed which he displayed at all times. He has been characterized as having had in him something of the austerity of the ancient Hebrew prophets; and he certainly spoke like one who brings his religion into his politics. Though called the 'Tribune of the People,' he never feared to antagonize public opinion whenever that opinion was out of conformity with his rigid standards of duty and right. Thus, being in general opposed to all war (as a result no doubt of his Quaker origin), he dared to advocate peace with Russia in 1854 at a time when the war fever was at its height; and again, in 1877-78, he stood opposed to British intervention in Russo-Turkish affairs. To America, especially, Bright rendered services of inestimable value during the period of the Civil War, in that he was undoubtedly the most prominent among the very few notable men in Parliament or out, who advocated the cause of the North against the South; and that, too, in spite of the fact that the continuance of the war was disastrous to his own interests as a cotton-spinner, and to the entire Lancashire cotton trade. But his moral power was most clearly shown in the period after the conversion of the Liberal Party to Home Rule in 1885. Mr. Bright, regarding such a policy as vicious, refused to follow his old leader, Gladstone, and did not hesitate to denounce openly the 'unholy alliance,' as he considered it, of the old Liberal Party with the Parnellites; although, to him, this meant the breaking up of ancient personal and political ties which effectually saddened the last years of his life. A collection of Bright's speeches was published at London in 1868, and his *Public Letters* in 1885. Consult: Barnett-Smith, *Life and Speeches of John Bright* (New York, 1881), and Robertson, *Life and Times of John Bright* (London, 1883).

BRIGHT, Richard (1789-1858). An English physician, born in Bristol. He was educated at Edinburgh, London, Berlin, and Vienna, and after 1820 was connected with Guy's Hospital. He conducted many important investigations in the field of pathological anatomy, and was the first to discover the true nature of the disease since known by his name. (See Bright's Disease.) He published *Original Researches into the Pathology of Diseases of the Kidney* (1827), and a book of *Travels through Lower Hungary* (1818), which contains a valuable account of the gypsies.

BRIGHT, William, D.D. (1824-1901). An English Church historian. He was born at Doncaster, England, December 14, 1824, and was educated at Rugby and University College, Oxford. He was ordained a priest in 1850, and for nine years was a theological tutor at Trinity College, Glenalmond. Returning to Oxford as tutor, he became in 1868 canon of Christ Church and regius professor of ecclesiastical history. He published editions of several Church fathers. Among his numerous original works may be mentioned: *History of the Church, from the Edict of Milan to the Council of Chalcedon* (1860); *Chapters of Early English Church History* (1878); *Notes on the Canons of the First Four General Councils* (1882); *The Roman See in the Early Church* (1896); *Some Aspects of Primitive Church Life* (1898). He died at Oxford, March 6, 1901.

BRIGHT'ENING. In calico-printing, the operation of rendering the colors of printed fabrics more bright or brilliant by boiling them in solutions of soda and other materials.

BRIGHT'LY, Frederick Charles (1812-88). An American lawyer, born at Bungay, Suffolk, England. He came to America in 1831, studied law, was admitted to the bar in 1839, and from 1870 was wholly occupied with legal authorship. His collection of 5000 volumes was considered one of the best private law libraries in the United States. His many compilations include *A Digest of the Decisions of the Federal Courts* (2 vols., 1868-73), and *A Digest of the Decisions of the Courts of the State of New York to January, 1884* (3 vols., 1875-84).

BRIGHTON, brī'ton (originally *Brighthelmstone*, named after an Anglo-Saxon bishop, *Brighthelm*, who was supposed to have founded it in the Tenth Century + *town*). A town and celebrated seaside resort, styled 'London by the Sea' and 'The Queen of Watering-Places,' in Sussex, England, on the English Channel, 50½ miles south of London (Map: England, F 6). It is built on a slope ascending eastward to a range of high chalk cliffs bounding the coast as far as Beachy Head; to the west, these hills recede from the coast and leave a long stretch of sands. It extends from Kemp Town on the east to Hove on the west. The town has suffered severely at various periods of its existence through inroads of the sea, and to guard against further encroachments, a great sea-wall has been built; further protection is furnished by numerous jetties projected seaward. A fine promenade, called the Front, the largest seaside promenade in Great Britain, extends along the sea-front for 4 miles. Brighton is well built, and possesses many handsome buildings, among them being several palatial hotels. Near the centre of the town is the Royal Pavilion, a fantastic Oriental or Chinese structure, with domes, minarets, and pinnacles, built for the Prince of Wales (afterwards George IV.), and acquired by the town in 1850. It contains assembly-rooms, a museum, picture-galleries, etc.

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The Dome, formerly the Royal Stables, also acquired by the town, has been turned into a magnificent concert-hall. The aquarium is world-famous. There are numerous theatres and music-halls.

Brighton obtained its charter of incorporation in 1854. It sends two members to Parliament. The town owns its excellent water-supply, as well as its electric-light plant, which yields a large profit. Among other municipal undertakings are public baths, markets, and slaughter-houses. The town has numerous parks and public race-grounds. In addition to its numerous private schools, the town has a municipal school of science and technology, and one of art, a grammar school, a public library, and the Dyke Road Museum, containing a fine ornithological collection. Brighton has no maritime trade. It is essentially a town for recreation and sea-bathing. There are several hospitals, including one for children, a blind and a deaf-and-dumb asylum. An electric street railroad connects Brighton with Kemp Town, and an electric shore road (overhead trolley) with Rottingdean. Population, in 1891, 115,873; in 1901, 123,478. Brighton was an important place in the Sixteenth Century, when it was twice ravaged by the French. The sea, however, now covers the ground where old Brighton once stood.

Consult: Sicklemore, *History of Brighton* (Brighton, 1827); Sawyer, "Old Brighton," in *Archæological Journal*, Vol. XLII. (London, 1886); "Progress of Brighton," in *Municipal Journal*, 3 (London, 1899).

BRIGHT'S DISEASE. The common name for *nephritis*, or disease of the kidneys. It takes its name from Dr. Richard Bright (q.v.), an English physician, who, in 1827, first recognized and described renal disease, and properly attributed to it the symptoms and the changes in the urine which it causes. The term is not distinctive, for it includes several forms of nephritis. For clinical purposes, diseases of the kidneys are classified according to the nature of the morbid process existing, whether it be congestion, degeneration, or inflammation. These processes are attended by accumulation of blood in veins and capillaries of the kidneys, changes in their blood-vessels and tissues, formation of new tissue and death of tissue, with resulting local and general symptoms and disturbances of function. We have, then, acute and chronic congestion of the kidney, acute and chronic degeneration of the kidney, acute and chronic exudative nephritis, acute productive nephritis, chronic nephritis without exudation, suppurative nephritis, and tubercular nephritis. There are many synonymous names for these diseases. The *causes* of nephritis may be as follows: (1) Prolonged exposure to cold; (2) poisons, such as alcohol, turpentine, cantharides, lead, arsenic, mercury, as well as the toxins produced during yellow fever, scarlet fever, gout, syphilis, suppuration, tubercle, cancer, etc.; (3) mechanical obstruction to the circulation, such as heart-disease and pleurisy with effusion. The *symptoms* of nephritis differ. In acute nephritis the patient may have merely slight headache, pain in the back and in the legs, loss of appetite and nausea, or he may have fever, prostration, stupor, twitching, shortness of breath, and convulsions. The urine generally contains albumen and casts, and there may be dropsy of the legs. In the chronic forms of the disease the symptoms are less severe, though shortness of breath, severe headache, anæmia, and dropsy generally predominate. In the *treatment* of nephritis, physicians generally recommend frequent change of scene and climate, reduction of sugars and starches and increase of fats in the diet, abstinence from alcoholic beverages and from tobacco, and life in the open air. Drugs are of much less value.

PATHOLOGY. In *acute congestion*, the kidneys are swollen and darker than normal, the vessels containing an increased amount of blood. There may be flattening of the tubules from pressure and exudation into them. In *acute degeneration* the kidney is usually somewhat enlarged; it may be congested, and the cortical portion is often swollen and pale. The cells of the kidney tubules are swollen and granular, and show various stages of disintegration up to complete destruction of the cells. Within the tubules are fat-globules, coagulated albumen, and granular matter, resulting from degeneration of the epithelium. In *acute exudative inflammation* the condition of the kidneys varies greatly. There may be simply congestion, with inflammatory products in the tubules. The kidney may be enlarged and congested, the cortex thick, pale, and wet. The epithelium of the tubules is apt to be swollen or flattened by the exudate, disintegrated, and there are collections of white blood-cells scattered throughout the cortex. In the lumina of the tubules are masses of coagulated albumen, casts (either clear or containing red or white blood-cells), and the results of cellular disintegration. In the glomeruli of the kidneys there is a thickening of the capsule epithelium and of the cells lining the capillaries, so that the outlines of the capillaries disappear. There is often an accumulation of coagulated albumen and detritus within the cavity of the glomerulus. In *acute productive inflammation* the kidneys are increased in size, the surface smooth, and the capsule non-adherent. An acute exudative inflammation such as has just been described is usually present, but added to this is an increase in the connective-tissue elements of the kidney, with consequent atrophy of the tubules. There may be extreme proliferation of the capsule-cells of the glomeruli. The kidneys remain permanently damaged organs.

In *chronic congestion* the kidney is somewhat enlarged, heavy, hard, of dark-red color, the surface smooth, and the capsule non-adherent. The epithelial cells of the tubules may be swollen, and in the glomeruli the capillaries are distended, and there is more or less thickening of their walls. In chronic degeneration, due to heart-disease, the kidneys are usually large and white, the cortex being thickened. The epithelium of the tubules is swollen and granular, and in the glomeruli the capsule-cells are distended and their walls thickened. In the degeneration which occurs in wasting diseases, the changes in the glomeruli are apt to be absent, while in senile degeneration the kidney may be either large and white, or small, red, and atrophied, with changes in the epithelium of the tubules, but no change in the glomeruli. In *chronic diffuse inflammation with exudation*, or *chronic parenchymatous inflammation*, the appearance of the kidney varies greatly. It is usually enlarged, more rarely it is of normal

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size or small. Its surface may be smooth or nodular. The cortex may be thickened and white, or mottled. The epithelium of the tubules may be flattened by exudate, or swollen and granular. Some tubules are of normal size, others are dilated, while still others are compressed by the new connective tissue. Within the lumina are coagulated albumen, disintegrated epithelium, and red and white blood-cells. In the glomeruli there is an increase in the connective-tissue elements with atrophy, and the capillaries may show waxy degeneration. There is an increase in the interstitial connective tissue of the kidney, but it is not extensive. The arteries often show increased thickness of walls. In *chronic diffuse inflammation*, without exudation, or *cirrhosis* of the kidney, the kidney is apt to be small, its surface rough, and its capsule adherent. Rarely the kidneys are large. The increase in connective tissue is the most marked feature, and is often extreme. Dependent upon or determining this increase in connective tissue is atrophy of the tubules and of the glomeruli. The tubules are sometimes greatly swollen, and form casts. The blood-vessel walls are usually thickened, and the capillaries of the glomeruli may show waxy changes. See ALBUMINURIA; and KIDNEY. Consult Osler, *Principles and Practice of Medicine* (New York, 1901).

BRIGITTINES, brij'it-tinz, or ORDER OF OUR SAVIOUR. An order founded in 1346, as a branch of the Augustinians, by Saint Bridget, or Brigitta, of Sweden. It took in both men and women. The first monastery, which was also the mother house of the order, was on the founder's estate at Vadstena, on the eastern bank of Lake Vettern, southwest of Stockholm. At the other houses of the order the monks and nuns inhabited contiguous buildings, but never saw each other, and each sex governed its own affairs. Their occupations were largely literary, and they prepared Swedish translations of religious works, mostly of evangelical tendency. The order spread through Scandinavia and Finland; also into Holland, Germany, Italy, and Spain. Henry V. (1413-22) introduced it into England, and founded Sion House, near Brentwood, 7½ miles west of London. Henry VIII. suppressed it, for its wealth was great. Mary reëstablished it, but Elizabeth again suppressed it. The nuns then went to Portugal, and opened their house in Lisbon. In 1861 some of their successors came back and opened a house in Spetisbury, Dorsetshire. Later on it was moved to its present site, Chudleigh, near Exeter. In Sweden the order had so firm a hold that the mother house was not suppressed till 1595, when most of the houses outside had ceased to exist. The order was revived in Belgium as Brothers of the Revised Brigittine Order, and in Spain as Nuns of the Order of Saint Bridget, and there it has now half a dozen convents. Only four convents of the original order now are found—one in Bavaria, at Altomünster, two in Holland, and the one mentioned in England. For the history of the order in Sweden, consult: *Scriptores Rerum Svecicarum Medii Ævi I.* (Stockholm, 1871); also *History of the English Brigittine Nuns* (Plymouth, 1886). The Basel reformer Œcolampadius was a Brigittine monk.

BRIGLIADORO, brē'lyä-dō'rō (It., from *briglia*, bridle + *d'* = *di*, of + *oro*, Lat. *aurum*, gold). The name given to Orlando's steed in Boiardo's *Orlando Innamorata*, on account of the splendor with which he was bridled.

BRIGNOLES, brē'nyōl'. The capital of an arrondissement in the Department of Var, France, on the Calami, 22 miles southwest of Draguignan (Map: France, N 8). It is picturesquely situated in a fertile valley, surrounded by forest-clad hills, and has some fine old buildings. The palace of the Counts of Provence is occupied by the prefecture; the Templars' house is now a theological seminary. Brignoles has tanneries, potteries, silk, woolen, and cloth manufactures, and a trade in brandy, wines, prunes, and olives. The town was known as Villa Puerorum in connection with the rearing of the children of the Counts of Provence. It was captured and sacked by Charles V. in 1524 and by the Leaguers in 1528. Population, in 1901, of town, 3904; of commune, 4748.

BRIGNOLI, brē-nyō'lē, PASQUALE (1824-84). An Italian tenor, born in Naples. He received an excellent musical training, at first in piano, and later in singing. He appeared with great success in concert and opera, in Paris, London, and the principal cities of Europe; then came to the United States, under Strakosch, in 1855, and for a quarter of a century was one of the most popular operatic tenors. He sang with Patti at her début, and appeared with all the great singers of his time — Parepa-Rosa, La Grange, Tietjens, and Nilsson among them. Brignoli's voice was a true tenor of beautiful quality, great carrying power, and wonderful flexibility. His vocalization and phrasing were of the highest order, but he lacked grace in figure, and was a poor actor. He received high prices for his singing, yet he died in New York a poor man.

BRIGS OF AYR, THE. A delightfully humorous little poem by Robert Burns, reporting an imaginary colloquy between the old and new bridges (Scot. *brigs*) over the Ayr. The old 'brig' resents the pretensions of the new-comer, and its petulance is vented in a way very true to human nature.

BRIHASPATI, brī-hŭs'pä-tē, or **BRHASPATI**, br'hŭs'pä-tē (Skt. *Bṛhaspati*). A Hindu god prominent in the Rig-Veda, but of less importance in the later mythology of India. His name appears frequently also in the form *Brahmaṇaspati*, 'Lord of Strength,' or 'Lord of Prayer' (*brahman*), and as the incarnation of the *brahman*-lord he appears to have been the prototype of the god Brahma, the head of the later Hindu Trinity. (See BRAHMA.) Like the latter, also, he is 'father of the gods,' although himself begotten by Tvashtar, the artificer. He is portrayed in the Vedas as having seven mouths, seven rays, a hundred wings, sharp horns, and armed with bow and arrows and a hatchet; he is ruddy and bright, dispelling the darkness; and he rides upon a chariot drawn by ruddy steeds. Many of his attributes, and especially his aspect as a divine priest presiding over devotion and sacrifice, recall Agni, the god of fire, of whom he is regarded by many scholars merely as a variety. But his close connection with Indra (q.v.) in the Vedic hymns leads others to consider Brihaspati in his sacerdotal character as a priestly abstraction of Indra. In

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later times of the epic and the Puranas he is a Rishi, or divine seer, and preceptor of the gods. He is regent of the planet Jupiter, with which his own name is commonly identified. His wife is Tara. Consult: Macdonel, *Vedic Mythology* (Strassburg, 1897); Dowson, *Dictionary of Hindu Mythology* (London, 1879).

BRIL, brêl. The name of two Dutch painters, brothers.—MATTIJS (1550-84) was born in Antwerp and died in Rome. He was employed in the Vatican in the time of Gregory XIII., and instructed his brother Paul, who succeeded to his pension.—PAUL (1554-1626) was also born in Antwerp and died in Rome. He was the best of the Flemish landscape painters of his time; his influence was potent on the Italian schools of landscape painters. The poetic charm of his work may be seen as a setting to some of the figure-painting executed by such masters as Annibale Carracci and Rubens. His works in oil and fresco are in many of the Roman churches. He had for patrons both Clement VIII. and Sixtus V., doing for the latter many works in the Sistine Chapel, in the Scala Santa and Santa Maria Maggiore. His painting of the "Tower of Babel" is in the Berlin Museum, which contains also a landscape representing his later style. The Pitti Gallery in Florence possesses a number of his works. Consult: Brixton and Poynter, *German, Flemish, and Dutch Painting* (London, 1881); Lübke, *History of Art* (Eng. trans., New York, 1881).

BRILL (probably Corn. *brilli*, mackerel, for *brithelli*, from *brith*, speckled). A species of turbot, found in considerable abundance on some parts of the British coasts, and common in the markets of the larger towns. It resembles the turbot, but is distinguished by its smaller size (18 inches), more oval outline, the want of tubercles on its upper surface, and its reddish hue. It has the same haunts and habits as the turbot, but its flesh is not thought quite so good.

BRILLAT-SAVARIN, brê'yà' sà'và'răN', ANTHELME (1755-1826). A French writer on gastronomy, noted as the author of *Physiologie du goût* (1825). He was born at Belley, and was a federalist. During the Reign of Terror he fled to Switzerland, and in 1793 to New York, where he supported himself by lessons and music till his return to Paris in 1796. He held office under the Directory, and during the Consulate became judge in the Court of Cassation. His book reveals the genial host and friend, full of anecdote and shrewd observation. It is delightful, also, for its mock seriousness, its conscious grandiloquence, as when he invokes "Gasteria, the tenth and fairest of the Muses," and for the bizarre arrangement of his 'meditations' on *Corpulence ou la théorie de la friture*. Two translations of the *Physiologie* into English (London, 1877; New York, n. d.) are fairly satisfactory.

BRILLIANT (Fr. *brillant*, sparkling, from Lat. *berillus*, beryl, gem). A name popularly given to the diamond, especially when cut so that the base or flat portion, called a *table*, is surrounded by twenty-four facets, which extend to the girdle, or central edge, above which are thirty-two facets, terminating in a point called a *culet*.

BRIMSTONE. A name sometimes applied to sulphur, especially in the form of sticks or rolls. It is derived from ME. *brinnen, brennen*, to burn + *ston*, stone, sulphur having been considered by the alchemists as the principle of combustibility. See SULPHUR.

BRIN, brēn, BENEDETTO (1833-98). An Italian engineer and statesman, born in Turin. He studied engineering, became a chief of section in the Ministry of Marine, and was Minister of Marine in 1876-78, 1884-91, and from 1896 until his death. From 1882 he represented Turin in the Chamber of Deputies, and in 1892-93 he was Minister of Foreign Affairs. He did much to promote the mechanical development of the Italian Navy, and himself designed several armored cruisers.

BRINCK'MAN, CARL GUSTAV, Baron (1764-1847). A Swedish statesman and poet. He was born at Brännkyrka, near Stockholm, and studied at Upsala, Halle, Leipzig, and Jena. He became successively secretary of legation of the Swedish embassy at Dresden (1792), chargé d'affaires at Paris (1797), chargé d'affaires at Berlin (1801), ambassador to London (1808), and court chancellor at Stockholm (1810). His poetical works include: *Snillets verld* (1822), for which he received the first prize of the Swedish Academy; and *Tankebilder* (1828).

BRINDABAN, brĭn'dà-băn'. See BINDRABAN.

BRINDISI, brên'dê-sê (anciently, Lat. *Brundisium, Brundusium;* Gk. Βρεντέσιον, *Brentesion*, Βρεντήσιον, *Brentēsion;* said to have received its name from the harbor projecting like the antlers of a stag, from βρένδον, *brendon*, deer, stag). A seaport town of southern Italy, in the Province of Lecce. It is situated on a small promontory in a bay of the Adriatic Sea, about 45 miles east-northeast of Taranto (Map: Italy, M 7). Brindisi is a city of very great antiquity. It was taken from the Sallentines by the Romans B.C. 267, who, some twenty years later, established a colony here. The town, partly owing to the fertility of the country, but chiefly on account of its excellent port—consisting of an inner and outer harbor, the former perfectly landlocked, and capable of containing the largest fleets and of easy defense on account of its narrow entrance, and the latter also very well sheltered—rapidly increased in wealth and importance. It soon became the principal naval station of the Romans in the Adriatic. In B.C. 230 Brindisi was the starting-place of the Roman troops that took part in the first Illyrian War; and from this point the Romans nearly always directed subsequent wars with Macedonia, Greece, and Asia. And when the Roman power had been firmly established beyond the Adriatic, Brindisi became a city second to none in South Italy in commercial importance. Horace, who accompanied Mæcenas in a diplomatic expedition to Brindisi in B.C. 40, has made the journey the subject of one of his satires (*Sat.* i. 5). Vergil died here in B.C. 19, on his return from Greece. The city appears to have retained its importance until the fall of the Empire, but it suffered greatly in the wars which followed. When the Normans became possessed of it in the Eleventh Century, the Crusaders made it their chief port for embarkation to the Holy Land; but with the decline of the Crusades, Brindisi sank into comparative insignificance as a naval station. The city

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subsequently suffered greatly from wars and earthquakes. The principal buildings are the cathedral, where the Emperor Frederick II. was married to Yolande in 1225; and the castle, commenced by Frederick II., and finished by Charles V. The district around Brindisi is still remarkable for its fertility, olive-oil being produced in large quantities. Since the opening of the Suez Canal and the construction of the Mont Cenis and Saint Gothard tunnels Brindisi has greatly increased in importance, being the landing-place or point of departure for numerous steamship lines. Population, in 1881, 14,508; (commune) in 1901, 25,317.

BRIND'LEY, JAMES (1716-72). An English engineer. He was apprenticed at 17 to a millwright, but afterwards became an engineer, and in 1752 showed great ingenuity in contriving a water engine for draining a coal-mine. His invention of a silk-mill on a new plan and several other ingenious contrivances recommended him to the Duke of Bridgewater (q.v.), who employed him to build the canal between Worsley and Manchester. Thenceforth he devoted his great skill and genius to the construction of navigable canals, commencing the Grand Trunk and completing the Birmingham, Chesterfield, and others. He was quite illiterate, and did most of his work in his head without written calculations or drawings. Consult Samuel Smiles, *Lives of the Engineers*, Vol. I. (London, 1861-62).

BRINE (AS. *bryne*, literally, a burning, from *beornan*, to burn). The term applied to water highly impregnated with common salt. Brine-springs are those natural waters containing much salt, which in many parts of the world issue from fissures in the ground. See SALT SPRING; and WELL.

BRINE-SHRIMP. A small branchiopod crustacean (*Artemia salina*), which, unlike the greater number of animals of that group, is an inhabitant not of fresh, but of salt water. It is found in myriads swimming about in the brine of salt-pans previous to boiling, when, having been concentrated by exposure to sun and air for about a fortnight, it destroys the life of almost all other marine animals. The full-grown brine-shrimp is about half an inch long. One of the most curious things about this species is that it accustoms itself so readily to changes in the density of the water which it inhabits. It has been shown by experiment that if sufficient care is taken, these animals can, after a number of generations, live in perfectly fresh water; but, more remarkable still, it will then be found that they are no longer *Artemias* at all, but are now *Branchipus stagnalis*, a common fresh-water branchiopod, generically different from Artemia. This is one of the most direct experimental proofs of evolution yet known, and also shows admirably the great effect of the environment upon the form and structure of animals.

BRINJAREE (brĭn'-jà-rē)-**DOG.** The Indian greyhound. See GREYHOUND.

BRINK, BERNHARD TEN (1841-92). A German philologist. He was born in Amsterdam and studied in Münster (1861-62) and Bonn (1862-65). He was professor of modern languages at the University of Marburg (1870-73), and professor of English at Strassburg (1873-92). Among his works are the following: *Chaucer, Studien zur Geschichte seiner Entwickelung*, Vol. I. (1870); *Geschichte der englischen Litteratur*, Vol. I., Chaucer to Wyclif (1889, translated into English by H. M. Kennedy, 1883); Vol. II., from Wyclif to the accession of Elizabeth, 2d ed. by von Brandl (Berlin, 1803), in some respects the best history of English literature extant; *Chaucers Sprache und Verkunst* (Leipzig, 1884); 2d ed., ib., 1899); Beowulf, *Untersuchungen* (Strassburg, 1888); *Shakespeare: Fünf Vorlesungen* (ib., 1893; English translation, entitled *Five Lectures on Shakespeare*, by Julia Franklin, New York, 1895). He also published editions of Chaucer's *Prologue to the Canterbury Tales* (Marburg, 1871), and of the *Compleynte to Pite* (among the writings of the Chaucer Society, London).

BRINK, JAN TEN (1834—). A Dutch author, born in Appingadam. He studied in Utrecht, went in 1860 as tutor to Batavia, from 1862 to 1884 was instructor in the Dutch language and literature in the Gymnasium of The Hague, and in the latter year was appointed professor of the history of Dutch literature in the University of Leyden. His works, composed chiefly of studies in literary criticism, and stories, include *Bulwer Lytton, Biografie en kritiek* ("Bulwer Lytton: A Biography and a Criticism," Haarlem, 1873); *Letterkundige schetsen* ("Literary Sketches," ib., 1874-75); *Geschiedenis der Noord-Nederlandsche letteren in de XIX. eeuw* (Amsterdam, 3 vols., 1888-89); and *Romans en novellen* (Leyden, 13 vols., 1885). His complete works in belles-lettres have appeared in seventeen volumes, as *Litterarische schetsen en kritieken* ("Literary Sketches and Critiques," Leyden, 1882-88).

BRINK'ERHOFF, ROELIFF (1828—). An American banker, philanthropist, and penologist, born in Owasco, N. Y., June 28, 1828. He has been for years the central figure in the National Prison Congresses as well as a prominent worker in the National Conferences of Charities and Correction. Since 1878 he has been a member of the State Board of Charities of Ohio, and for many years its chairman. Through his efforts the public charitable and penological work in Ohio has been maintained at a high level of efficiency. General Brinkerhoff enlisted in the volunteer army in the Civil War, attained the rank of colonel, and was brevetted brigadier-general for meritorious service. He is the author of numerous articles and has published addresses on philanthropic subjects.

BRIN'TON, DANIEL GARRISON (1837-99). An American archæologist and ethnologist. He was born at Thornbury, Pa., graduated at Yale in 1858, and at Jefferson Medical College in 1861, and subsequently studied in Paris and Heidelberg. He served in the army as a surgeon, was editor of the *Medical and Surgical Reporter* from 1867 to 1887, and became professor of ethnology at the Philadelphia Academy of Natural Sciences in 1884, and of American linguistics and archæology in the University of Pennsylvania in 1886. In 1894 he was president of the American Association for the Advancement of Science. His chief works were *The Myths of the New World* (1868); *The Religious Sentiment* (1876); *American Hero Myths* (1882); *Races and Peoples* (1890); *The American Race* (1892); and *Religions of Primitive Peoples* (1897). Perhaps his richest contribution to anthropology

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was his *Library of Aboriginal American Literature* (8 vols., 1882-85), designed to "put within reach of scholars authentic materials for the study of the languages and culture of the native races of America." Just before his death he gave his entire library of books and manuscripts to the University of Pennsylvania.

BRINTON, JOHN HILL (1832—). An American surgeon. He was born in Philadelphia, and graduated at the University of Pennsylvania and the Jefferson Medical College. At the outbreak of the Civil War he volunteered his services, and remained in the army until 1865, attaining the position of brigade surgeon. He continued his practice in Philadelphia after the war, and has been at various times connected with the control of most of the principal hospitals in that city. In 1882 he was appointed professor of the practice of surgery and of clinical surgery in the Jefferson Medical College.

BRINVILLIERS, brăn'vê'yâ', MARIE MADELINE MARGUERITE, Marquise de (c.1630-76). A French woman, notorious as a poisoner. She was born about 1630, and married, in 1651, the Marquis de Brinvilliers. Incensed at her scandalous life, her father caused her lover, Sainte-Croix, to be thrown into the Bastile. There Sainte-Croix learned of an Italian named Exili the art of compounding poisons, and when free imparted the secret to his mistress, Brinvilliers. Immediately the two began to exercise their skill for the purposes both of revenge and of obtaining means to carry on their amours. Brinvilliers poisoned her father, her two brothers, and her sister, and attempted to poison her husband. But Sainte-Croix, not over-anxious to succeed to the latter's place, supplied him with antidotes. In 1672 Sainte-Croix died, poisoned by accident; his death led to an investigation that revealed the enormity of Brinvilliers's crimes. The Marquise fled, but was captured and executed, July, 1676. Brinvilliers was a woman of great piety, attended church regularly, and once, espousing the cause of a poor girl, poisoned a whole family. Her exposure soon led to the discovery of the famous poisoner La Voisin (q.v.), and the unearthing of other astonishing crimes that had been perpetrated in Paris. Consult Pirot, *La Marquise de Brinvilliers* (Paris, 1883). See also CHAMBRE ARDENTE.

BRINZ, brêntz, ALOYS von (1820-87). A German jurist and legislator. He was born at Weiler, Bavaria, and studied philology and law in Munich and Berlin. He was professor of Roman law at the universities of Erlangen, Prague, Tübingen, and Munich. In 1861 he was elected to the Imperial Council of Austria and became one of the chief defenders of the German interests in Bohemia. His principal work is the *Lehrbuch der Pandekten* (2d ed., 1873), and his other important contributions to the literature of jurisprudence are the following: *Zum Rechte der Bonæ Fidei Possessio* (1875); *Zur Contravindicatio* (1877); *Zum Begriff und Wesen der römischen Provinz* (1885).

BRION, brê'ŏn', FRIEDERIKE ELISABETH (1752-1813). A German lady, born at Niederrödern (Alsace), better known, from her place of residence near Strassburg, as Friederike von Sesenheim, and a figure in a familiar episode of Goethe's *Dichtung und Wahrheit.* (See GOETHE.) Goethe dedicated to her a number of his lyrics, and she has been declared the original of Maria in *Götz von Berlichingen*, and of other heroines of Goethe's works. Consult the study by Düntzer (Stuttgart, 1893).

BRION, GUSTAVE (1824-77). A French painter, born in Paris and known for his studies of Alsatian life and manners. Among his chief works are: "The Potato Harvest During the Inundation," "A Funeral in the Vosges," "A Marriage in Alsace," and "The Sixth Day of Creation." He also provided illustrations for Victor Hugo's *Les Misérables* and *Notre Dame de Paris* (1864).

BRION, brê-ŏn', LUIS (1782-1821). A Colombian naval officer. He was born in Curaçao, was educated in Holland, served in the Dutch Army, and studied navigation in the United States. He then established himself in business in Curaçao and greatly increased the fortune he had inherited. In 1811 he fitted out a ship at his own expense and defeated the Spanish on the island of Margarita. He also distinguished himself in the conquest of Guiana and sat in the Congress of Angostura, which proclaimed the independence of Colombia.

BRIOSCO, brê-ŏs'kô, ANDREA (1470-1532). An Italian sculptor and architect of the Renaissance. He worked in Padua and Verona, designing the Church of Santa Giustina (Padua), the Della Torre tombs in San Fermo at Verona, and a wonderful candelabrum for San Antonio, Padua.

BRISAC, brê-săk', CHARLES. The principal character in Fletcher and Massinger's comedy *The Elder Brother.* His father, disgusted at his sedentary habits, tries to secure to a younger son the inheritance of the family property and to marry that youthful fop to Angelica. The result of the latter attempt is to cause Charles to fall in love with Angelica himself. For her sake, he develops into a sturdy, chivalrous gentleman. His brother, Eustace, far from being injured by the change, also suffers a spiritual regeneration and gives up his foppishness.

BRISBANE, brĭz'bân (named in honor of Sir Thomas Brisbane). A seaport, the capital of Queensland, Australia, about 500 miles north of Sydney, situated near the mouth of a river of its own name, which falls into Moreton Bay (Map: Queensland, H 9). Regular steam communication is kept up with European and Australian ports. Several railroads terminate here. North and South Brisbane, two of its divisions, are connected by the Victoria iron bridge, 1080 feet in length. A prior bridge and nearly half of South Brisbane were destroyed by flood in 1893. Brisbane possesses some fine buildings, among the chief of which are the houses of the Legislature, the post-office, and the viceregal lodge. Brisbane is the seat of a United States consular agency, the see of Anglican and Catholic bishoprics, and has two cathedrals, numerous churches, banks and newspapers, four parks, a museum, a school of arts, and a university. It dates from a penal colony established in 1825 and abandoned in 1839. Its growth began in 1842 with the advent of free settlers; its incorporation as a city followed in 1859. Its water-works are municipal property. Population, in 1891, 48,738; in 1901,

BRISBANE, Sir THOMAS MAKDOUGALL (1773-1860). A British general and astronomer. He was born at Brisbane, the hereditary seat of his

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family, near Largs, Ayrshire, July 23, 1773. At the age of 16 he entered the army as an ensign, and in the following year, when quartered in Ireland, became intimate with Arthur Wellesley, afterwards Duke of Wellington. With a company that he raised in Glasgow in 1793, Brisbane took part in all the engagements of the campaign in Flanders. Sent to the West Indies in 1796, he distinguished himself under Sir Ralph Abercromby, and in 1812, under the Duke of Wellington, in Spain. Appointed Governor of New South Wales, in 1821, he introduced many reforms, especially in penal treatment, promoted horse-breeding, the cultivation of sugar-cane, wine, tobacco, and cotton, and at the close of his administration, in 1825, left 50,000 acres of cleared land where he had found only 25,000. The town of Brisbane was named after him, as also the river on which it stands, which was discovered under his auspices. High as Brisbane ranks as a soldier and administrator, as a man of science he holds a still higher place. While in Australia, he catalogued no less than 7385 stars, for which great work, known as the *Brisbane Catalogue of Stars*, he received the Copley Medal from the Royal Society. On his return to Scotland, he had an astronomical observatory established at his residence at Makerstoun, and devoted himself entirely to scientific pursuits. He entered warmly into the plans of the British Association for ascertaining the laws of the earth's magnetism, and in 1841 had a magnetic observatory erected at Makerstoun, the observations made there filling three large volumes. He was made a baronet in 1836, G.C.B. the following year; received from Oxford the degree of D.C.L., and succeeded Sir Walter Scott as president of the Royal Society of Edinburgh. He died at Largs, January 27, 1860.

BRISE'IS (Gk. Βρισηΐς, *Brisēis*). In Homer's *Iliad*, the daughter of Briseus and the captive of Achilles. She was carried off by Agamemnon, and so gave rise to the quarrel between the two heroes.

BRISK, Fastidious. A volatile, witty, and dapper courtier, fond of practical jokes, in Ben Jonson's *Every Man in His Humour*.

BRISSAC, Count de. See Cossé, Charles de.

BRISSON, brē'sôn', Barnebé (Lat. *Brissonius*) (1531-91). A French jurist and diplomat, born at Fontenay-le-Comte of a distinguished family. Brisson chose the legal career, and rapidly advanced in his profession. In 1575 he became King's Advocate, later Councilor of State, and in 1583 President à Mortier. In this year he was dispatched on a diplomatic mission to England to arrange a marriage between Elizabeth and the Duke of Anjou; and thereafter he was frequently sent as envoy to foreign countries. In 1588, when King Henry III. was obliged to flee from Paris, Brisson remained behind, apparently in the hope of reconciling the King and the people. After the King's death in August, 1589, Brisson resisted the intrigues of the Spanish ambassador and the claims of the Papal envoy, and had the Duke of Mayenne proclaimed lieutenant-general of the kingdom. He unfortunately fell under suspicion of favoring Henry IV., and, at the orders of the Council of Sixteen, was arrested and hanged, November 15, 1591. Brisson was a man of remarkable judgment and learning, and was held in such esteem by Henry III. that that monarch declared no king had in his service so learned a man as he. His literary works were numerous; the most important are the following: *De Verborum Quæ Ad Jus Pertinent Significatione*, etc. (1557); *Observationum Divini Et Humani Juris Liber* (1564); *De Formulis Et Solemnibus Populi Romani Verbis*, etc. (1583), a work of great value not yet superseded, last edited by Conrad (1781); *Code de Henri III.* (1587); *Notæ in Titum Livium* (1588); *Opera Minora*, chiefly on Roman law and institutions (1606), etc. Consult Le Bas, *Dictionnaire encyclopédique de la France*, Vol. III. (Paris, 1835-63).

BRISSON, Eugène Henri (1835—). A French statesman. He began the practice of law in 1859, but engaged also in journalism, and in 1868, together with Challemel-Lacour and Allain-Targé, established the *Revue Politique*. He was elected to the National Assembly as a Republican in 1871, and soon submitted a proposition of amnesty for all political offenders. He became president of the Chamber of Deputies in 1881, was the head of the French Cabinet in 1885 (April to December), was again chosen president of the Chamber of Deputies in 1894, and was once more head of the Ministry from June to October, 1898. In the election for President of the Republic to succeed M. Cassimir-Perier, January 17, 1895, he received 361 votes to 430 for François Félix Faure. As president of the commission on the Panama scandals, and as one of the chief opponents of rabid anti-Semitism and militarism in the Zola and Dreyfus trials, when president of the Chamber, and Premier, he rendered great services to his country.

BRISSON, Mathurin Jacques (1723-1806). A French natural philosopher, born at Fontenay-le-Comte (Vendée). He was instructed by the famous Réaumur, and was professor of physics in Paris, successively at the Collège de Navarre, the Ecoles Centrales, and the Lycée Bonaparte. In his own day he was widely known as an ornithologist, particularly through his six-volume *Ornithologia* (1760; with 500 plates), since quite superseded. His further works include a *Dictionnaire raisonné de physique* (6 vols., 1800).

BRISSOT DE WARVILLE, brē'sô' de vär'vêl', Félix Saturnin (1818—). A French animal painter. He was born at Sens, Yonne, and studied under L. Cogniet at the Ecole des Beaux-Arts (1835). In his representation of animal life he reveals a remarkable fidelity to nature. His scenes are laid principally in Normandy and Touraine, and in the forests of Compiègne and Fontainebleau. The following are some of his most celebrated works: "The Thicket" (1881); "Leaving the Park" (1883); "The Return" (1884); "Sheepfold" (1885); "Return of the Flock" (1885); "A Corner of the Sheepfold" (1888).

BRISSOT DE WARVILLE, Jean Pierre (1754-93). A French jurist and politician. He was born at Chartres, January 14, 1754. Though his father was a 'modest innkeeper,' Brissot received a good education, and was trained for the bar. Two scholarly works on criminal law, *Théorie des lois criminelles* (1780), and *Bibliothèque des lois criminelles*, published soon after, established his reputation as a jurist. His passion for political studies

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carried him beyond the narrow bounds of his profession, and, in conjunction with his friends Clavière and Mirabeau, he produced several works on finance. A master of the English language, he attempted to conduct in London a journal entitled *Journal des lycées*, but not being successful, returned to Paris. He was imprisoned in the Bastile for four months, on a false charge of having written a brochure against the Queen. Upon his release he again engaged in the writing of pamphlets upon politics and economics, and was compelled to take refuge in England for a time, on account of his fearless expression of opinion upon the condition of affairs in France. In 1788 he founded the Society of the Friends of the Negroes (Société des Amis des Noirs), and visited the United States to study the problems of slavery and emancipation and to promote the abolition of the slave trade. At the outbreak of the Revolution he returned to France and entered actively into political affairs, establishing a journal, *Le Patriote Français*, which at once became the recognized organ of the Republicans. He became the leader of a strong group of young reformers, who were known as Brissotins, and who afterwards formed the Girondist Party. He was frequently consulted by the Constitutional Committee of the Assembly, and in 1791 was elected to that body from Paris, against the opposition of the Court party. He was also a member of the Convention, and used his influence against anarchy and for moderation. He disapproved the execution of the King, and urged that the question be submitted to the people. He thus incurred the distrust and hostility of the extreme Jacobins, who came into power in 1793, and was one of the twenty-one Girondist leaders who were guillotined on October 31 of that year.

Consult: Brissot, *Mémoires pour servir à l'histoire de la Révolution*, 4 vols. (Paris, 1830; new edition by Lescure, 1877); Desmoulins, *The History of the Brissotins*, translated from the French (London, 1794).

BRIS'TED, CHARLES ASTOR (1820-74). An American author, the son of the Rev. John Bristed and grandson of John Jacob Astor. He was born in New York, and was educated at Yale and at Trinity College, Cambridge, England. For several years he was a contributor to periodical literature over the signature of 'Carl Benson.' He was one of the first board of trustees of the Astor Library. Among his collected works are: *The Upper Ten Thousand of New York* (1852); *Five Years in an English University* (1852); *The Interference Theory of Government* (1867); and *Letters to Horace Mann* (1850), in which he replied to attacks upon John Jacob Astor and Stephen Girard.

BRISTLE-BIRD. An Australian wren-like bird of the genus Sphenura, having two or three pairs of strong, recurved bristles at the angles of the mouth. Three species are known in southern and western Australia. "They mostly conceal themselves in thickets, especially in marshy places, flying very little, but running very quickly, and carrying the tail erect. The nest is built of dry grass, globular in form, and is of large size."

BRISTLES (dim. of *brust*, a bristle; cf. Ger. *Bürste*, brush). The strong hairs growing on the back, and to a less extent on the sides, of the hog, wild boar, and some other animals, and extensively used in the manufacture of brushes, and also by shoemakers and saddlers. The quality of bristles depends on the length, stiffness, color, and straightness, white being the most valuable. The best bristles are produced by pigs that inhabit cold countries. The Russian hog is a long, lean animal, and the thinner the hog the longer and stiffer the bristles. When the Russian hog is sent to the south and fattened, the bristles become soft, and of course depreciate in value. In the summer the hogs are driven in herds through the forests, to feed on soft roots, etc., when they shed their bristles by rubbing against the trees. The bristles are then collected, sewed up in horse or ox hides, and sent to fairs, whence they find their way, through agents, to all countries. In American slaughter-houses the bristles of the slaughtered hogs constitute one of the by-products, being collected, cleaned, and sorted for the market by the pork-packing establishments of Chicago, Kansas City, and other cities in large quantities. Enormous quantities of bristles are employed in the manufacture of brushes. See BRUSH and BROOM.

BRISTLETAIL. Any small wingless insect of the order *Thysanura*, regarded as the simplest and lowest of all true insects. It dwells in dark, damp places, under bark, stones, etc., and sometimes infests the kitchens of untidy houses or the woodwork of bake-shops. In the same order are the springtails and podurids. The bristletails, or 'silver-fish' (Lepisma), are swift, agile creatures, having flat, fish-shaped bodies, covered with silvery scales, long, thread-like antennæ, and two or more caudal filaments. They will destroy upholstery, bound books, etc., if neglected.

BRIS'TOL (MS. *Bristowe*, AS. *Briegstow*, the place at the bridge). An important maritime city and civic county in the west of England, situated at the junction of the rivers Frome and Avon, between the counties of Gloucester and Somerset. It is eight miles from the confluence of the Avon with the Severn, which empties into Bristol Channel, and about eleven miles northwest of Bath (Map: England, D 5).

The original city was composed of the territory bounded by the two rivers, but it has been extended from time to time, so that it now includes Clifton, Redcliffe, Horfield, Stapleton, Saint Thomas, Saint George, etc., in all about 11,397 acres. The cathedral, formerly an Augustinian church (1148), has little to commend it but its handsome Norman chapter-house, the Early English north aisle of the choir known as the Berkeley Chapel, and the Norman west portal. Some remains exist of the ancient castle, built probably by Geoffrey, Bishop of Coutances, and improved by Robert, Earl of Gloucester, in the early part of the Twelfth Century. Saint James Church is a good specimen of Norman architecture, and other noted churches are Saint Philip's, Saint Stephen's, All Saints, the Mayor's Chapel, and the Temple Church, but more famous than these, perhaps, is the Church of Saint Mary Redcliffe, which is notable for its symmetrical proportions and richness of design. Its tower, more than 200 feet high, was partly destroyed by lightning in 1445, but was rebuilt in 1872. Many interesting old houses are to be found in

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the Pithay and Maryleport Street. Clifton, the best known of Bristol's suburbs, is a favorite place of its wealthy residents. The suspension bridge over the Avon was, at the date of construction (begun in 1836), one of the largest in the world, having a centre span of 676 feet. The floating harbor and quays are very extensive and are formed by embanking and locking the old courses of the Avon, which now flows through a new channel. In addition, the city owns extensive docks at Avonmouth and Portishead.

Bristol returns four members to Parliament. The floating harbor and quays are very extensive, a municipal council, and a board of aldermen. (See GREAT BRITAIN, *Local Government.*) The streets, which are mostly paved with wood or asphalt, are kept in excellent condition by the city's public-works department. Bristol owns and operates an electric-light plant, at an annual profit of about $10,000. The city maintains public baths and wash-houses, charging a nominal price for their use, placing them within reach of the poorer classes of the people. Its markets net it annually about $13,000. There are numerous parks and pleasure grounds. Among its educational institutions are, in addition to its public schools, University College, Clifton College, the ancient grammar school (established in 1532), the Redland High School for Girls, a school of art, a municipal school of cookery, a municipal library (with seven branch establishments), several museums, a zoölogical and a botanical garden, and an observatory.

It has numerous benevolent and charitable institutions, the Queen Elizabeth Hospital, the Muller Orphanage, a sailors' home, a blind asylum, and several hospitals, including two municipal isolation hospitals.

The city is one of the most important ports in Great Britain, and its trade is of long standing. In the records of the Fourteenth Century it is mentioned as having a large trade in cloths, leather, wine, and salt, and was one of the 'staple towns.' It was prominent in the early commercial ventures and in discovery. It is the port from which John Cabot sailed in 1497 upon the voyage which resulted in the discovery of the mainland of America. Bristol traders colonized Newfoundland and engaged largely in the commerce with the West Indies and the American colonies. Shipbuilding has been a prominent industry there for many years. The *Great Western*, the pioneer of steam communication across the Atlantic (1838), was built at Bristol. The principal imports are cattle, oils, hides, petroleum, grain, tallow, and sugar; the exports are iron, copper, tin plates, coal, salt, cotton goods, earthenware, chemicals, and other manufactured products. The total tonnage entered and cleared at the port in the year 1899 was over 2,900,000. The total value of imports and exports in 1900 exceeded £12,700,000 ($63,500,000). Bristol is the seat of a United States consulate.

The city existed before the Roman invasion, but does not come into prominent notice until 1069, when Harold's three sons, in an attempt to regain their patrimony from William the Conqueror, sailed up the Avon, but were defeated under the walls of Bristol. Henry II. gave the city its charter in 1171, and it received the rights of a county from Edward III. During the Civil War, Bristol was alternately held by Royalists and Parliamentarians. The castle and fortifications were destroyed in 1655 by Cromwell's orders. A notable rising of the populace occurred in 1793 over the imposition of a bridge toll beyond the time fixed for its discontinuance, and the 'Bristol Revolution' in 1831, during the Reform Bill agitation, resulted in the destruction of the Bishop's palace, custom-house, and other public and private buildings, and in the loss of several lives. Among other celebrities born or connected with Bristol are William of Worcester, the poets Chatterton and Southey, the artist Laurence, Sydney Smith, Coleridge, and Hannah More. Population, in 1891, 289,280; in 1901, 328,842.

BIBLIOGRAPHY. Nicholls, *How to See Bristol* (Bristol, 1885); Raffalovich, *Condition du Pauvre à Bristol* (Paris, 1885); "An American's Impressions of Bristol," in *Gloucestershire Notes and Queries*, Part XLIII. (London, 1889); Hunt, *Bristol* (London, 1889); Latimer, *Bristol* (Bristol, 1898); Taylor, *Some of the Public Institutions of Bristol* (London, 1900); "Bristol: A Glimpse of the Old and New Municipality," in *Municipal Journal*, IX. (London, 1900); Masse, *The Cathedral Church of Bristol* (London, 1901); Nicholl and Taylor, *Bristol, Past and Present* (3 vols., Bristol, 1880); Latimer, *Annals of Bristol in the Nineteenth Century* (Bristol, 1887).

BRISTOL. A borough in Hartford County, Conn., 18 miles west-southwest of Hartford, on the New England Railroad (Map: Connecticut, D 3). It has a public library. The manufactures include clocks, brass goods, tableware, knit goods, tools, etc. Originally a part of Farmington, Bristol was incorporated as a town in 1785, and as a borough in 1893. Population, in 1900, 6268. Consult Trumbull, *Memorial History of Hartford County* (Boston, 1886).

BRISTOL. A borough in Bucks County, Pa., 23 miles northeast of Philadelphia, opposite Burlington, N. J., on the Delaware River, the Delaware and Lehigh Canal, and the Pennsylvania Railroad (Map: Pennsylvania, G 3). It has a foundry and rolling-mills, carpet-factory, hosiery, worsted, and yarn mills, planing-mill, wall-paper factory, and patent-leather works. The borough is noted for its mineral spring. Bristol, originally called Buckingham, was settled in 1681. A detachment of the American Army was stationed here during part of the Revolution. Bristol was first incorporated in 1720, and the charter of that year, as revised in 1851, is now in operation. The executive holds office for three years, and the power of appointments is vested with the borough council. Population, in 1890, 6553; in 1900, 7104.

BRISTOL. A town, port of entry, and county-seat of Bristol County, R. I., 15 miles south by east of Providence, on Narragansett Bay, and on the New York, New Haven and Hartford Railroad (Map: Rhode Island, C 3). The public library building is one of the features of the town. Bristol has an excellent harbor, and the principal industries are boat-building, and the manufacture of rubber, woolen, and cotton goods. Population, in 1890, 5478; in 1900, 6901.

Many antiquarians believe that it was at or near the present Bristol that the Northmen, in 1000 and subsequently, built the dwellings mentioned in the Icelandic Sagas. Within the

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limits of the present town the Narragansett village Mount Hope, the residence of Massasoit and King Philip, was located, and it was near here that the latter was killed in 1676. Bristol was first settled by the whites about 1675, and was incorporated as a town in 1746. On October 8, 1775, and again on May 25, 1778, the English entered the town and did considerable damage. In 1873 a portion of the township was annexed to Warren. Consult Munro, *History of Bristol* (Providence, 1880).

BRISTOL. A town in Sullivan County, Tenn., also a city in Washington County, Va., the boundary line of the two States running through the principal street, on the Southern and Norfolk and Western railroads (Map: Virginia, B 5). It has extensive lumber-mills, pulp-mills, tannery, and minor manufactures. The educational institutions include King College (Presbyterian), organized 1867; Sullins College (Methodist Episcopal, South), and Southwest Virginia Institute (Baptist), for women, established 1869 and 1884 respectively; and a Normal College for negroes. Settled in 1851, Bristol was incorporated the following year. The present charter was adopted in 1898 and revised in 1901; it provides for a mayor, elected biennially, and two councils, one in each State. There are municipal water-works. Population, in 1890, 6226; in 1900, 9850—5271 in Tennessee and 4579 in Virginia.

BRISTOL BAY. A shallow eastern arm of Bering Sea, north of the peninsula of Alaska (Map: Alaska, D 4).

BRISTOL BOARD. A thick, stiff paper or fine pasteboard, made with a smooth and sometimes with a glazed surface. It was first made at Bristol, England, and is used by artists and draughtsmen.

BRISTOL BOY, THE. A nickname for Thomas Chatterton.

BRISTOL BRICK, or **BATH BRICK.** A substance composed of fine-grit sand, and used mainly for cleaning and polishing table cutlery and other bright steel surfaces. It was formerly made only in Bristol, England, but is now produced in the United States.

BRISTOL CHANNEL. An inlet of the Atlantic Ocean, in the southwest of England, between South Wales and Monmouthshire on the north, and the counties of Devon and Somerset on the south, prolonged at its east end by the estuary of the Severn (Map: England, B 5). It is about 80 miles long and 5 to 48 miles broad, the greatest breadth being between Saint Gowan's Head and Hartland Point. It is the largest inlet in Great Britain, having an irregular coast line of 220 miles, and receiving a drainage of 11,000 square miles. The chief rivers which flow into it are the Towy, Taff, Usk, Wye, Severn, Avon, Axe, Parrott, Taw, and Torridge. The tides rise to an extraordinary height—at Bristol, 35 feet; at King's Road, 40 feet; and at Chepstow, a rise of 47 feet has been recorded. Barnstaple or Bideford and Bridgewater bays are on the south, Swansea and Carmarthen bays and Milford Haven on the north. Lundy Island is at the entrance to the channel.

BRISTOW, brĭs'tō, BENJAMIN HELM (1832-96). An American lawyer and politician. He was born in Elkton, Ky., graduated at Jefferson College, Pa., in 1851, and practiced law in his native State until the beginning of the Civil War, when he volunteered for service in the Union Army and soon rose to the rank of colonel. He was appointed United States Solicitor-General in 1870, and was nominated as Attorney-General of the United States in 1873, but was not confirmed. From 1874 to 1876 he was Secretary of the Treasury, and in this office was active in the prosecution of the 'Whisky Ring' (q.v.). This gave him a reputation as a reformer, and at the Republican National Convention of 1876 he received 113 votes on the first ballot for Presidential candidate. In that year he removed to New York, where until his death he had a large legal practice.

BRISTOW, GEORGE FREDERICK (1825-98). An American musician and composer. He was born in Brooklyn, N. Y., became a violinist in the New York Philharmonic Society in 1842; from 1851 to 1862 was conductor of the New York Harmonic Society, and subsequently conducted the Mendelssohn Union. He was also organist in various churches and a teacher of music in the public schools of New York. His works include *Rip Van Winkle*, an opera produced in New York in 1855; an overture to an unfinished opera, *Columbus;* an oratorio, *Daniel* (1867); an *Arcadian Symphony* (1874); and a cantata, *The Great Republic* (1880), with accompaniment for orchestra.

BRISTOWE MERCHANT, THE. See FORD, JOHN.

BRISTOWE TRAGEDY, THE, or THE DEATH OF SIR CHARLES BADWIN. A narrative poem by Thomas Chatterton, presented by the author to his vulgar patron, Catcott, in 1768, and printed in quarto in 1772. It was the first of the "Rowley Poems." It describes the execution of a romantic outlaw.

BRISTOW, or **BRISTOE, STATION.** A village in Prince William County, Va., four miles southwest of Manassas Junction, on the Southern Railway. On August 26, 1862, during the Civil War, General Jackson, by a sudden movement, captured a large quantity of Federal supplies and munitions of war which had been stored here; but, threatened by an attack of 40,000 Federals under McDowell, he withdrew on the 27th to the Bull Run battleground. Here, also, on October 14, 1863, the rear-guard of General Meade's Federal army, under General Warren, repulsed with great gallantry the attack of a superior Confederate force under Gen. A. P. Hill, each side losing between three and four hundred in killed and wounded.

BRIT, or **BRET.** (1) The young of the common herring, formerly thought to be a small separate species, living along the New England coast. The term is frequently applied to the small fry of various other marine fishes. (2) A sailor's term for the food of the whalebone whale, which consists of entomostracans, pteropods, and various other small surface-swimming animals.

BRITAN'NIA (Lat., Gk. Βρεττανία, *Brettania*, from Βρεττανοί, *Brettanoi*, Britons). The ancient name of England and Scotland. (See BRITANNICÆ INSULÆ.) Julius Cæsar invaded Britain twice, in B.C. 55 and 54. In the latter year he subdued Cassivellaunus, who agreed to

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pay tribute; but as no Roman garrison was left, the island remained independent. The emperors Augustus, Tiberius, and Caligula maintained friendly relations with its chiefs, as they thought its subjugation would be too difficult. In A.D. 43, under Claudius, the conquest began. The first expedition secured a portion of the island; and from that time, in spite of stubborn resistance, especially by Caractacus and Boadicea, the invasion progressed steadily, and Britain became a Roman province. Agricola, in A.D. 78-85, finished the conquest up to the Firth of Forth, and did much to Romanize the inhabitants. The people of the Highlands maintained their independence. In A.D. 122 Hadrian visited Britain and began the construction of the wall, known by his name, from the Tyne to the Solway, some 70 miles in length. Later, in A.D. 142, the wall of Antoninus was built across the narrowest part of the island, from the Firth of Clyde to the Firth of Forth, about 37 miles long. Both of these walls were intended as bases for military operations, and were strengthened by numerous military posts. They do not mark the frontiers of the Roman possessions. The subsequent military history of Roman Britain is marked by few events of importance. (See CALEDONIA; CARAUSIUS; PICTS; SEPTIMIUS SEVERUS.) The Roman legions were withdrawn in A.D. 409, and Britain soon became the prey of invaders. See ANGLO-SAXONS.

In the later Empire, according to the *Notitia Dignitatum*, Britain formed a diocese of the prefecture of Gaul and was subdivided into five provinces: *Maxima Cæsariensis*, *Valentia*, *Britannia Prima*, *Britannia Secunda*, and *Flavia Cæsariensis*. The boundaries of these provinces are very uncertain. To insure the obedience of the natives, at least three Roman legions were usually in Britain. Under the Romans, many towns (*coloniæ* and *municipia*)—fifty-six are enumerated by Ptolemy—arose in Britain, and were the means of diffusing Roman law and civilization over the country. Among the most important were: *Londinium* (London), *Eboracum* (York), *Verulamium* (Saint Albans), *Camulodunum* (Colchester), *Durovernum* (Canterbury), *Venta Icenorum* (Norwich), *Aquæ Solis* (Bath), and *Lindum* (Lincoln). The Romans built many roads (*strata*), of which there are still numerous remains. (See WATLING STREET.) They also developed Britannia into a corn-growing country. Druidism was the religion of the Britons at their conquest by the Romans, but the latter introduced Christianity and Roman learning into the country. There are many remains still extant of the presence of the Romans in Britain, such as camps, roads, ruins of houses, baths, flues, altars, mosaic pavements, painted walls, metallic implements and ornaments, weapons, tools, utensils, pottery, coins, sculptures, bronzes, inscriptions, etc. These remains show that the Romans sought to render their British conquests permanent, and that they had greatly improved the arts of the ancient Britons, as is evident on comparing the remains with the far ruder native antiquities of the British pre-Roman or prehistoric era, such as tumuli, barrows, earthworks, so-called Druidical monoliths, and circles, cromlechs, cairns, pottery, weapons, tools, utensils and ornaments, etc. Many of the Roman remains in Britain also show that the Romans had introduced into the country the refinements and luxuries of Rome itself.

Under the term Britannia, Great Britain has been personified in the fine arts as a female seated on a globe or on an island rock, leaning with one arm on a shield, with the other hand grasping a spear or a trident. The first example of this personification is on a Roman coin of Antoninus Pius (died A.D. 161). The figure reappears first on the copper coinage of England in the reign of Charles II. (1665); the celebrated beauty, Miss Stewart, afterwards Duchess of Richmond, is said to have served as model to the engraver Philip Roetier. The Britannia that appears on the reverse of British copper coins since 1825 was the design of Mr. W. Wyon. (See NUMISMATICS.) Among a considerable number of good books on ancient Britain, consult especially: Elton, *Origins of English History* (London, 1882); and Scarth, *Roman Britain* (London, 1883). Bury, in *The Student's Roman Empire* (London, 1893), gives a very accurate account of the conquest.

BRITANNIA METAL (first manufactured in England; see below). An alloy of tin, antimony, copper, and sometimes zinc. Its composition is adapted to the special uses for which it is intended, the relative amounts of its constituents being as follows: From 81 to 90 parts of tin, from 8 to 16 parts of antimony, from 1 to 2 parts of copper, and sometimes 2 parts of zinc. The alloy may be cast, and is malleable, so that it can be rolled into thin sheets. Being harder than pewter, it has largely superseded that alloy for many purposes, while its other valuable properties lead to its extensive use for domestic utensils, such as spoons, drinking-cups, and teapots. With the introduction of the electro-plating processes, it found an increased application as a base for plated ware. A brilliant lustre can be given to Britannia metal by heating articles made from it in a bath containing cream of tartar, tartar emetic, hydrochloric acid, powdered zinc, and powdered antimony. By varying the proportions and omitting the zinc, golden, copper-red, violet, and blue-gray tints may be obtained. A metallic ring has been given to articles made from Britannia metal by heating them in an oil bath to 220° C. Britannia metal was first manufactured in Sheffield, England, by Hancock and Jessop, in 1770. At present Sheffield and Birmingham are the principal localities of its manufacture. A variety of Britannia metal, consisting of 9 parts of tin and one part each of antimony, bismuth, and lead, is called *Queen's metal*, and is used for the same purposes as Britannia metal.

BRITANNIA SECUN'DA (Lat., second Britain). The Roman name of Wales (q.v.).

BRITANNIA TUBULAR BRIDGE. See BRIDGE.

BRITAN'NICÆ IN'SULÆ (Lat., translation of Gk. Βρεττανικοὶ νῆσοι, *Brettanikoi nēsoi*, British Islands). A term used by Greek and Roman authors for the British Isles, including Albion (England and Scotland) and Hibernia, or Ierne (Ireland), with the adjacent islands. The Phœnicians visited these islands in order to procure tin. Herodotus, in the Fifth Century B.C., mentions the Tin Islands, but knows nothing definite about them or their location. Aris-

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totle, in the Fourth Century B.C., is the first to mention them by name, and speaks of only the two, Albion and Ierne. Pytheas of Massilia, a little later, made a voyage to the British Isles, and described them and their inhabitants at considerable length. Julius Cæsar was the first to call Albion 'Britannia.' Strabo and Diodorus Siculus both speak of Britain at some length. Ptolemy, about A.D. 150, described Ivernia and Albion much more accurately. He located Scotland erroneously, but he gave an excellent account of the coast of England. Consult Tozer, *History of Ancient Geography* (Cambridge, 1897).

BRITAN'NICUS. The son of the Emperor Claudius and Messalina, born February 12, A.D. 41. His real name was Tiberius Claudius Cæsar; but the title *Britannicus*, by which he is known in history, was bestowed by the Senate after the campaign in Britain in 43. In 48 Messalina was put to death, and Agrippina, who now gained the ascendency over the Emperor and soon after married him, persuaded him to pass over his own son, Britannicus, and name as his successor her son, Nero. Fearful that Britannicus might prove a rival, Nero, as emperor, caused him to be poisoned by Locusta, early in A.D. 55, at the age of 14 years.

BRITISH AMERICA. The general term applied to the British possessions of North America north of the United States, which thus include Canada and Newfoundland. With a broader meaning British America includes also all British possessions on or adjacent to the American Continent; in addition to the above, they comprise the Bermuda Islands, the British West Indies, Belize or British Honduras, British Guiana, and the Falkland Islands, which see, under their respective headings.

BRITISH ARMY. See ARMIES.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. See ADVANCEMENT OF SCIENCE, ASSOCIATIONS FOR THE.

BRITISH CENTRAL AF'RICA. A name applied to the British territory north of the Zambezi River, including the northern part of Rhodesia (q.v.) and the British Central Africa Protectorate (q.v.).

BRITISH CENTRAL AFRICA PROTECTORATE. A British colonial possession in Central Africa, occupying the eastern part of British Central Africa, known formerly as Nyassaland. It is bounded by Lake Nyassa, Portuguese East Africa, Rhodesia, and German East Africa, and covers an area of over 42,000 square miles. It occupies an elevated plateau, well watered, and with a climate less unhealthful than any of the surrounding territories. The principal river is the Shiré, which crosses the province of that name. The chief agricultural products are rice and coffee, the latter being cultivated mostly in the Shiré Province. The introduction of wheat has been attended with considerable success. The chief exports are coffee, rubber, and ivory. The total value of the imports and exports for 1901 amounted to $710,000 and about $190,000, respectively, showing a considerable decline from 1900. The chief inland port of the protectorate is Chiromo, at the junction of the rivers Ruo and Shiré. The British Government maintains a naval station and free port at Chinde, on the coast of Portuguese East Africa. The government of the protectorate is administered by a commissioner under the Foreign Office. For administrative purposes the protectorate is divided into twelve districts. The revenue is derived chiefly from a hut tax, customs duties, and a Government grant. The local revenues and total expenditures for 1901 amounted to $240,000 and $380,000, respectively. There is a military force of about 1300, under British and Sikh officers, besides a naval force of three gunboats. There is a telegraph line across the protectorate to Lake Tanganyika, which is to be extended to the Nile. The native population of the protectorate, calculated on the basis of the hut tax, is about 900,000. The larger part of the population is confined to the Shiré Province, while large tracts of territory are uninhabited, on account of the slave raids of former times. The European population numbers about 450. The largest town is Blantyre, on the Portuguese frontier, with a population of over 6000, including about 100 Europeans. The headquarters of the administration are at Zomba. The trade ports are Port Herald, Chiromo, and Kotakota (the last on Lake Nyassa).

British Central Africa Protectorate was organized in 1891 out of a part of the territory administered by the British South Africa Company, and was put directly under the Foreign Office. In 1895 war was carried on with various tribes on the southern frontier, which, under the leadership of Arab slave-traders, had been raiding the country on man-hunting expeditions. In 1898 and 1899 considerable progress was made toward determining the boundary between the protectorate and German and Portuguese East Africa.

Consult: Johnston, *British Central Africa* (London, 1897); Scott Keltie, *The Partition of Africa* (London, 1895); Decle, *Three Years in Savage Africa* (London, 1897).

BRITISH COLUM'BIA. One of the largest of the provinces of the Dominion of Canada (Map: Canada, F 5), situated on the Pacific Coast, between the United States and the Yukon District, latitudes 49° and 60° N. The southern extension of Alaska forms a narrow strip between its northern half and the sea, as far south as Portland Canal, below which the coast is bordered by the Queen Charlotte and other lesser islands and by the great island of Vancouver (q.v.). The eastern boundary of the province follows the watershed ridge of the Rocky Mountains to Athabasca Pass, and then conforms with the 120th meridian of west longitude to its intersection with the 60th parallel, southwest of the outlet of Great Slave Lake. This gives an area of about 340,000 square miles.

TOPOGRAPHY. Except the remote, almost uninhabitable northeastern corner, British Columbia is, as it is popularly called, a 'sea of mountains.' Their general trend is northwest-southeast, in conformity with that of the American Cordillera, of which they are a part; but historically they have much local individuality. Orographically, the mountains fall into three systems—the Rocky Mountains, in the eastern half of the province, the Cascade Range in the western half, and the Coast Range, whose summits constitute the large islands. But one must be more minute, in order to understand the

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geography of this region. The Rocky Mountains, along the eastern border of the province, continue northwestward until they fade out in the hills about Dease Lake. In the southern part of the province, where they are crossed by the transcontinental railroad, they, with their subordinate ranges, are about 150 miles wide, and consist of lines and groups of upturned Carboniferous and Devonian strata, presenting vast cliff faces toward the northeast, and thinly wooded slopes toward the southeast. They are broken by cross-valleys, giving exit to streams to flow east as the sources of the North and South Saskatchewan, Athabasca, and Peace rivers, and to the west as tributaries of the Fraser and the Columbia; geologically they may be regarded as the equivalent of the foothills that border the front of the Rocky Mountains farther south. These mountains rise from an area of depression, the general level of the plains about their base being not above 3000 feet, and consequently their heights above the sea do not often exceed 10,000 feet (Leroy, Goodsir, and Victoria, and Dawson and Sir Donald among the Selkirks, are among the loftiest summits in the south, 10,000 to 11,600 feet in height); but farther north, near latitude 53°, a much greater elevation is attained, a group of peaks lying near the headwaters of the Saskatchewan rising seemingly to 13,000 and 14,000 feet. Mounts Brown and Hooker are near this region, but their elevations are much less than they were at one time supposed to be. The passes are correspondingly low, those used by the railroads or for wagon-roads varying from 5200 to 5500 feet at their summits. West of these mountains, and divided from them by a line of distant though narrow gorges, occupied by Kootenay Lake and by the head-streams, successively northward, of the Columbia, Canoe, and Fraser rivers, there rises the Columbia or Gold Range, which is composed of Archæan rocks and represents the geological backbone of the cordillera. A part of it, or closely bound in with it, south of the 52d parallel is the magnificent glacier-crowned Selkirk Range, around which the Columbia makes its way in a loop of continuous cañons, and west of which it flows southward, through the long and narrow Arrowhead Lake, into the United States. The small and comparatively open region at the southern end of the Selkirk Range, in the central depression of which lie Kootenay Lake and the tortuous Kootenay River, is 'the Kootenay country,' which during the last decade of the Nineteenth Century became prominent and populous as a mining and stock-raising region. West of the Columbia gorges lies the comparatively low, rounded, and forested Gold Range proper, which is traceable north to the 54th parallel, where the head-stream of the Fraser forms a loop about its terminus, just as the Columbia does about the Selkirks. It is in the Selkirks that is situated the group of great glaciers, so easily accessible and constantly visited by tourists from the Canadian Pacific Railway (which crosses the range through Roger's Pass, 4300 feet), among a cluster of summits—Sir Donald, Mount Bonney, etc.—exceeding 10,000 feet in altitude and perpetually covered with snow and ice. The Gold Range takes its name from being the place where profitable gold-mines were first found in the interior.

West of this system there lies a plateau valley about 100 miles broad, continued from the United States northward 700 miles through British Columbia. Its northern portion holds the Parsnip and Findlay rivers, which, meeting on the 56th parallel, form the Peace River and break through to the east. South of a dividing east and west line of hills, on the 54th parallel, the waters gather in the large Fraser and Thompson rivers. These flow south through deep cuts in the Carboniferous and later surface rocks, and having united, cut their way to the Pacific, near the international boundary, in a series of remarkable cañons, followed by the transcontinental railway. This interior plateau, whose valleys have a general level of about 1200 feet above the sea, is deeply cut by its many streams, diversified by hills, and contains many lakes confined in elongated valleys, of which the largest are Babine and Stewart lakes, in the far north; Quesnel Lake, in the centre; the Sicamous lakes, near the Canadian Pacific Railway; and the long and important Okanagan Lake, in the south.

The mountains which lie between this interior valley region and the Pacific Coast are locally known as the Cascades, because they seem continuous with the Cascade Mountains of Oregon; but they are an immense local uplift, some 100 miles in width, reaching from the Fraser Delta, which river in reality passes around their southern end rather than across the uplift, northward to the break in the coast marked by Chatham Sound, the Skeena River, Portland Canal, etc. They consist of a huge mass of Paleozoic rocks, which have been so compressed, broken, and heated by intrusions of granite and other vicissitudes as to be largely converted into crystalline rocks and greatly displaced; so much so as to be turned completely upside down over large areas. Hence the scenery is extremely rugged and picturesque. The parallel range on Vancouver Island, though similarly ancient, seems to have been less violently disturbed in its elevation. Little exploration has been made of these ranges, whose crowded peaks rise 8000 to 10,000 feet above the sea, and are loaded with snowfields and glaciers. Their seaward side is deeply indented by long, narrow inlets (fine harbors), which make the coast closely resemble that of Norway. Some of these inlets penetrate the mountains for many miles, as Howe Sound, Jervis and Bruce inlets, the latter connected with the large interior Chilco Lake. Dean Inlet and Douglas Channel wind inland for more than 50 miles each, and the Strait of Georgia and Queen Charlotte Sound are only similar arms of the sea, meeting behind Vancouver Island in the narrow water passage of Johnstone Strait.

CLIMATE AND SOIL. The climate of British Columbia exhibits various constant phases, due to topography and situation. It is, as a whole, far warmer than that of the eastern coast at a similar latitude, as will be recognized by reminding the reader that between 49° and 60° on the Atlantic Coast lie the ice-bound and desolate regions of Labrador. This warmth is due to the fact that the prevailing winds come steadily from the west, and reach the land warm with their passage over the vast breadth of the Pacific, whose waters on this coast have a temperature of 52° F. (about the same as on the Irish Coast), or 20 degrees warmer than those

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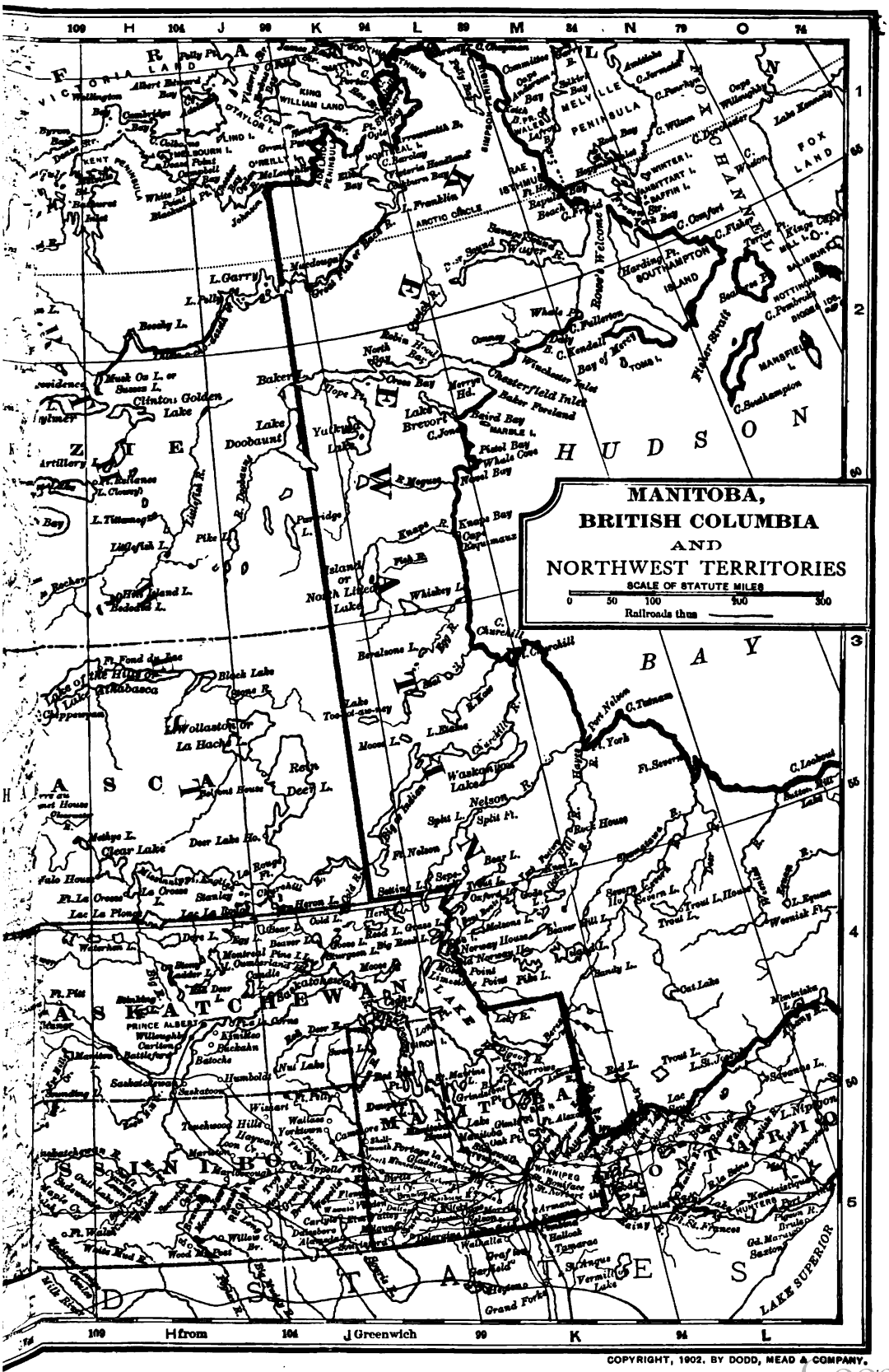

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of the northwestern Atlantic. These warm winds are loaded with moisture. They are chilled by their first contact with the high coast mountains, causing rapid condensation of the moisture and a heavy rainfall, accompanied by liberation of heat. This is more marked at the northern end of the province than in the south. The consequence is an equable rainy climate on the coast, very similar to that of the south of England, the rainfall usually amounting to about 86 inches at Vancouver. It is least copious in the early autumn. At Victoria the mean temperature for January is 37.2° F.; for July, 59.6° F.; and flowers bloom all the year round in the gardens. At Agassiz, in the lower Fraser Valley, the figures are 33° and 63.9°. Relieved of much of their moisture and warmth, lifted up to 8000 or 9000 feet, and cooled and rarefied by crossing the coast mountains, the west winds are kept at that height by the buoying currents of warm air rising from the heated valleys, and blow across the great interior plain without interruption; hence over this wide area rain is very infrequent in summer, the snowfall is light in winter, and there results the conditions of drouth, treelessness, and extremes of heat and cold, which are characteristic of interior plains everywhere. At Kamloops, about 200 miles from the coast, the annual rainfall hardly amounts to 12 inches, and the thermometer varies from 100° above zero in midsummer to 40° or 50° below zero in midwinter. Agriculture depends upon irrigation, the tablelands are covered with bunch-grass, and the climate is like that of Idaho or Alberta. East of these interior valleys, however, stand the Rocky Mountains, whose summits catch the wind and collect from it almost all its remaining moisture. Hence the Gold Range and Selkirks are crossed in all their lower slopes with heavy forests, their crests bear hundreds of glaciers, and the snowfall in the passes amounts to 30 feet in depth; and hence, also, the powerful rivers they sustain. Little moisture is left for the easternmost parts of the Rockies, whose climate is comparatively dry, very cold and clear in winter, and whose forests are thin. Similar conditions in the north, with the favorable addition of the Chinook, make the Peace River Valley not only pleasantly habitable, but clothed with a vegetation much like that of Ontario, and possessed of climatic and agricultural possibilities similar to those of Scotland.

Soils vary, of course, over so wide and diversified a region, but fertility is general. The rich delta of the Fraser is a perennial garden, and vegetables and fruits there reach an extraordinary perfection. In the interior, light, dry soils prevail, which prove highly productive under irrigation, and seem particularly rich in the Okanagan and Nicola districts. Arable regions are limited, however, and form a small part of the total area of the province. On the interior plateau the rainfall is insufficient for the growth of crops, and the rivers so generally flow through deep, narrow channels that the irrigable area is very limited. On the coast and elsewhere, where the rainfall is greater, the forest growth is usually so heavy that it requires great expense to clear and maintain land for cultivation. Wheat grows luxuriantly, but the kernel is too soft for milling purposes. Nevertheless, the southern portion of the province contains scattered districts admirably adapted to ranching and agricultural pursuits, and progress has been made in the delta and lower valley of the Fraser River, and in the Okanagan district. In the latter region, especially, fruit-farming and hop-raising are attaining much importance, and the southern plateau and part of the interior are remarkably well adapted to the cultivation of these products, where labor necessary for picking the hops is supplied by the Indian population. In the late nineties the fruit-growing industry of the Fraser Valley suffered much from the prevalence of fungous diseases affecting trees and fruit. Considerable market-gardening is engaged in by the Chinese in the neighborhood of the larger towns. The pastures of British Columbia are proving valuable. On the Cariboo road (between Soda Creek and Quesnel), there is a plain 150 miles long, and 60 or 80 wide; and between the Thompson and Fraser rivers there is an immense tract of grazing land. The creamery system has been introduced, and in 1900 there were eight creameries in the province.

Flora and Forests. The flora is distinctly of a northern type, and the forest resources of the province rank next to the mineral wealth in importance. British Columbia probably contains the largest unbroken area of merchantable forests on the continent. The western slopes of the mountains, particularly the coast ranges, are covered with a dense growth of forest trees which attain remarkable proportions. On the eastern slopes the forests are not so dense nor the trees so large, while much of the interior plateau is well-nigh treeless. The lower Fraser country especially is densely wooded. Smaller streams and the numerous inlets and arms of the sea give access to extensive forests all along the coast. Owing to the very limited Pacific Coast market, the forest resources have as yet been but little drawn upon. There are about eighty sawmills in the province, and the annual cut runs from 50,000,000 to 100,000,000 feet. The most abundant and valuable species is the Douglas fir. On the coast it sometimes attains a height of 350 feet. The white cedar is also widely distributed, and is extensively used for shingles and for finishing purposes. The yellow cedar, confined largely to the more northern regions, is also of great commercial value. The dense forests of spruce and hemlock north of Knight's Inlet afford an almost inexhaustible supply of pulp-wood of a superior quality. The precipitous coast streams supply all the power necessary for carrying on the pulp-manufacturing industry, and arrangements have been made looking to its establishment. Other important varieties are Menzie's fir, yellow pine, arbor vitæ, yew, oak, white maple, aspen, cherry, willow, and cottonwood.

Fauna. The animals of British Columbia are those of the Northwest generally. Wapiti remain only along the eastern foothills of the Rocky Mountains, but moose, black-tailed deer, and caribou are abundant throughout the valleys everywhere, while the bighorn abounds upon the Alpine pastures of the Rocky Mountains and the white goat frequents the summits of the coast ranges. Bears, wolves, and wild-cats are known everywhere, but the puma is unknown except along the southern border, and is rare there. Fur-bearing animals are numerous, and in the northern part a great trade in the collection

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of peltries from Indian trappers is still carried on. This province presents more attractions to the sportsman and hunter of big game than almost any other part of North America; and excellent game-fish abound in all its streams.

GEOLOGY. The geology of British Columbia has been studied only in a very general way, and large areas are still unexplored. In the Rocky Mountains, Archæan rocks are represented by granites, gneisses, and schists, which underlie immense thicknesses of Paleozoic strata ranging from the Silurian to the Carboniferous. Jura-Trias beds are found overlying the Paleozoic in places. At the close of the Triassic, the first upheaval took place in the Gold Range, and in the highlands of Vancouver and Queen Charlotte islands. Cretaceous rocks are found along the coast, and probably also along the upper course of the Skeena and the Lower Nechacs rivers. They hold valuable coal deposits where they outcrop on Queen Charlotte and Vancouver islands. Tertiary strata occur in the southwestern coast region. In the interior of British Columbia between the Rocky and Coast ranges there are areas occupied by limestones, quartzites, serpentines, and igneous rocks, the age of which has not been determined. A large part of British Columbia is mineralized, and gold, silver, lead, and copper ores are wrought in numerous localities. Rossland, Kaslo, Yale, Nelson, Slocum, Trail, and New Denver are important centres of mining industry. Auriferous gravels, resulting from the erosive action of glaciers and rivers, are of widespread occurrence and yield considerable quantities of gold.

MINING. Mining is the principal industry of the province. Placer mining for gold was carried on extensively as early as 1857 along the Fraser River and its tributaries. In 1863 the output reached $3,900,000, a large part being obtained from the northern interior, about the headwaters of the Fraser, called the Caribou District. The output then diminished, reaching the minimum of $380,000 in 1893. The introduction of hydraulic methods and machinery produced a revival of industry and so increased the output that in 1900 the product exceeded $4,700,000 in value, nearly three-fourths of which was obtained from the *lode* mines. Silver and lead are obtained from the same ores in the southeastern part of the province, and they have consequently had a parallel development. The silver output increased in value from $73,000 in 1890 to $2,400,000 in 1900, while the value of the lead for the latter year slightly exceeded that amount. Copper-mining is one of the most recent in development, but one of the most promising in its outlook. This, too, is obtained from the southeastern portion of the province, where extensive operations began about 1890, in the Kootenay district. From $111,000 in 1896, the value of the output increased to $1,600,000 in 1900. The output of coal (bituminous) doubled in value during the decade, being $4,300,000 in 1900. This, however, is mined almost exclusively from Vancouver's Island. Vast resources of coal exist in the eastern foothills of the Rockies.

FISHERIES. The position of British Columbia upon the Pacific coast, giving her the advantage of the enormous quantities of fish which frequent the coast waters and streams, is another important source of wealth to the province. British Columbia is second to Nova Scotia alone in the importance of her fisheries. The exports of fish exceeded $1,000,000 for the first time in 1882, and exceeded $2,000,000 in 1890, while in the nineties the exports averaged about $3,500,000. The total value of the product in 1899 was $5,200,000, of which $4,000,000 represented the salmon-fisheries. The salmon-fisheries are most extensive along the Fraser River. On this river only nets are allowed, which, together with other stringent regulations, has prevented the depletion of the supply. Seal-fishing is not so important as in former years. The catch increased from 9000 in 1883 to 95,000 in 1894, when it declined to 35,500 in 1900. The greater portion of the catch was from pelagic fishing. Herring, sturgeon, halibut, oolachan, and cod are among the fishery products.

TRANSPORTATION AND COMMERCE. The transportation facilities of British Columbia have not been fully developed. Communication with the East is, however, established by means of the Canadian Pacific Railroad, which crosses the province, and is connected at two points with the railroad system of the United States. The same company has a branch route from the East into the Kootenay region, where the short lines and steamboat routes connect the various mining towns. The rivers, as a rule, are too precipitous to admit of navigation. Steamers ascend the Fraser as far as Fort Yale, and others run upon its upper waters, and on Lake Okanagan, etc.; but the interior is dependent for transportation mainly upon stage lines. Telegraph and mail routes penetrate to all civilized parts of the province. Its position on the Pacific gives British Columbia an advantage with respect to the Oriental and Pacific Coast trade, but there is some uncertainty as to what the future of this will be, particularly in view of the building of an Isthmian canal. The province imported $10,300,000 worth of goods for home consumption in 1900, the value having doubled during the decade. The total exports amounted to $17,800,000, or three times that of a decade earlier. Coal and fish are the two most important exports.

GOVERNMENT. British Columbia is represented in the Canadian Parliament by three Senators and six members of the House of Commons. The local government is in the hands of a local Legislature of thirty-three elected members, a Lieutenant-Governor, appointed by the Dominion Government, and an Executive Council. The chief towns are Victoria and Vancouver. At the close of the century the receipts amounted to $1,544,000—the Dominion subsidy, general mining receipts, and free miners' certificates being the most important sources. The expenditure for the same year was $1,831,000, the construction of public works, education, and interest on public debt being the largest items.

BANKS. The clearing-house transactions of Victoria in 1900 amounted to $32,000,000, and those of Vancouver to $46,160,000. The province contains post-office and Government savings-banks.

EDUCATION. There are free public schools, and, differing from most Canadian provinces, they are wholly under secular control. The system comprehends common, graded, and high schools, with a total teaching force of nearly 500. There are also a number of private schools. The city school districts are divided into three classes, and to these the Provincial Government gives a per

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capita allowance of $13, $15, and $20, respectively, according to the average actual daily attendance of public-school pupils, and all additional expenses are locally provided for. The total cost of education to the province in 1899-1900 was $307,479, and to the cities, $81,886. Schools in the rural districts are under the management of a board of three trustees, while in the city districts the trustees number three, five, or seven, according to the class into which the city falls. The wives of qualified freeholders or leaseholders are eligible for the position of school trustees.

RELIGION. The leading religious denominations, according to the census of 1901, are: Church of England, 40,672; Catholics, 34,227; Presbyterians, 34,176; Methodists, 25,021; Baptists, 6506; and Lutherans, 5332. Among the Chinese and Japanese there were 10,027 Buddhists and 4804 Confucians.

POPULATION. In 1901 the population numbered 190,000, or nearly double that of 1891, the largest rate of increase recorded in any of the Canadian provinces during that decade. In the five-year period, 1896-1900, there were 27,273 immigrants into the province, or nearly twice those of any preceding period of equal length. Only a little over half, or 99,612, were born in Canada, of whom 59,589 were born within the province. Of the other countries represented, the most important are: the British Islands, 30,629; the United States, 17,164; China, 14,576; and Japan, 3515. A sentiment has developed against the Asiatics, and they do not come in as large numbers as formerly. As is common in newly settled countries, the males (114,081) far outnumber the females.

Victoria, the capital, containing a population of 20,800, is situated in the southern extremity of Vancouver Island. Vancouver, the largest city, population 26,200, is situated on the coast of the mainland. Of the other cities, the largest are Nanaimo, 6130; Nelson, 5273; Rossland, 6159; and New Westminster, 6499.

INDIANS. The census of 1901 gives the Indian population as follows: West Coast Agency, 2750; Fraser River Agency, 3380; Babine and Upper Skeena Agency, 2783; Williams Lake Agency, 1899; Northwest Coast Agency, 3994; Kootenay Agency, 562; Cowichan Agency, 2029; Kamloops Agency, 2880; Okanagan Agency, 651; Kwawkewlth Agency, 1639; bands not counted, about 2500; making a total of 25,068. While the Indians are decreasing in numbers, the amount of the decrease is not known, owing to the uncertain accuracy of earlier estimates. The influences of civilization, however, are thought to have arrested the decay, and there is even an increase in some of the tribes. The status of the coast tribes of British Columbia presents a number of contrasts with that of the Indians of the interior plains and regions farther east. Food is more abundant, the climate is milder, and the Indian is more industrious, and consequently famines are almost unknown, although no annuities or financial assistance is given them. Many of them now own comfortable houses. Land is set aside for the Indians, which they are not allowed to sell without permission from the Government. They are not obliged, however, to remain on these reservations, but may acquire property elsewhere, and under certain conditions are admitted to the rights of franchise. Acts passed by the Indian chiefs and councilors may be enforced if approved by the Government. Their interests are protected by the Indian Department of the Dominion Government. The census returns 6769 as Protestant and 12,628 as Catholic. The Indian schools are conducted on denominational lines.

HISTORY. Captain Cook, the famous explorer, visited a part of the coast of British Columbia in 1778, and ten years later an English settlement was established at Nootka by Captain John Meares, formerly a lieutenant in the British Navy, though it was almost immediately broken up by the Spanish, who claimed the whole coast as far as the Russian possessions, on the basis of prior discovery. For some time war appeared imminent between England and Spain, but in 1793 the difficulties between the two Courts were settled by arbitration, England receiving all the northwest coast from Nootka Sound to the Russian trading posts in Alaska. Meanwhile, in 1792, Captain George Vancouver (q.v.) circumnavigated the island which bears his name, besides exploring a part of the coast of the mainland; and in 1793 Alexander Mackenzie (q.v.), a partner in the Northwest Company, reached the coast of the present British Columbia after an arduous overland journey from Lake Athabasca. For many years the territory now included within the province formed part of 'New Caledonia,' throughout which the Northwest Company and later the Hudson Bay Company (with which the Northwest Company was amalgamated in 1821) carried on trading operations; and in 1843 a fort was built by the Hudson Bay Company on the site of the present city of Victoria. A considerable portion of the territory at this time was claimed by the United States, on the strength of the Louisiana Purchase, and feeling ran high, giving origin to the campaign cry of '54-40 or fight.' But under Polk the matter was arbitrated.

In 1849 Vancouver Island was erected into a Crown colony, though it remained under the virtual control of the company, Sir James Douglas occupying both the position of Governor and that of the company's chief factor. In 1856 an assembly was called, though the island was still only sparsely settled. Gold was discovered in the bed of the Fraser River in 1856, and, settlers having arrived in some numbers, New Caledonia was also organized as a Crown colony in 1858 under the name of British Columbia, of which also Douglas acted as Governor for several years. In 1863 an act was passed by the British Parliament establishing as the boundaries of the colony the Pacific Ocean and the frontier of the Russian territory in North America to the west, the sixtieth parallel of north latitude to the north, the one hundred and twentieth meridian of longitude and the summit of the Rocky Mountains to the east, and the northern boundary of the United States to the south. The two colonies were united under the name British Columbia in 1866, and five years later the new province thus created was admitted into the confederation of Canada, the Dominion Government pledging itself to pay a considerable subsidy to the province and to secure the construction within ten years of a railroad connecting the seaboard of the province with the main railway system of Canada. The road, however, was not completed until 1885. Soon after its admission into the Dominion, British Columbia secured a constitution under which a government was organized similar to those of the other prov-

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inces. The southern, southwestern, and northwestern (Klondike) boundaries of British Columbia have at various times formed the subject of considerable controversy between the United States and Great Britain. See OREGON; and SAN JUAN BOUNDARY, THE.

BIBLIOGRAPHY. British Association for the Advancement of Science, *Handbook of Canada* (London, 1897); Gosnell, *Year Book of British Columbia* (London, 1898); Mill, *New Lands* (London, 1900); Begg, *History of British Columbia* (Toronto, 1894); Baillie-Grohman, *Fifteen Years in the Hunting Grounds of Western America and British Columbia* (London, 1900); Smith, "The Archæology of British Columbia," in *American Antiquarian*, Vols. XXIII., XXV. (Chicago, 1901); Green, *Among the Selkirk Glaciers* (London, 1890); Ingersoll, *The Canadian Guide-Book: Part II., Western Canada* (New York, 1893); Dawson (and others), *Reports Geological Survey of Canada*, and *Official Publications of the Province of British Columbia.*

BRITISH EAST AFRICA. All the territory within the British sphere of influence, situated between German East Africa, Congo Free State, and French Congo on the south and west, Italian Somaliland, Abyssinia, and Egyptian Sudan on the north, and the Indian Ocean on the east (Map: Congo Free State, G 2). Outside of this territory under the immediate control of the British Foreign Office, British East Africa also embraces the islands of Zanzibar and Pemba, which are under the rule of the Sultan of Zanzibar. A large part of the territory of British East Africa constituted formerly the dominions of the British East Africa Company. Its area is estimated at 1,000,000 square miles, but these figures can hardly be considered as accurate, in view of the fact that the northern boundary line separating the Egyptian Sudan as well as a part of the western boundary are only vaguely outlined. For administrative purposes the colony is divided into the protectorate of Uganda (q.v.) and British East Africa Protectorate (q.v.).

BRITISH EAST AFRICA PROTECTORATE, or IBEA (originating from the initials of *Imperial British East Africa Company*). The southeastern part of British East Africa (q.v.), extending from the Umba to the Juba River, and inland as far as the boundaries of Uganda (q.v.). Its area is estimated at 280,000 square miles. The northern portion of the territory presents a striking contrast to the southern. The former is generally only slightly elevated, although the part bordering on Abyssinia is interspersed with isolated mountains from 5000 to 7000 feet high. It is a dry region, swarming in the vicinity of the coast with tsetse-flies, which render impossible the employment of animals for the carriage of burdens. The southern part resembles in its formation the northern part of German East Africa, and is covered by mountain masses of volcanic origin, some of the summits, as those of the Aberdare and Kenia mountains, reaching altitudes of 13,000 and 17,000 feet. The district bordering on Uganda has an elevation of 4000 to 7000 feet and is well adapted for cattle-raising. The climate is generally unhealthful except in the more elevated parts of the interior, which are practically the only part of the colony adapted to European colonization. The only rivers flowing through the coast region are the Sabaki and the Tana, the latter being navigable for about 280 miles. The lack of sufficient water communication on the coast presents an almost insuperable obstacle to the development of that region, and before the construction of the Uganda Railway considerably hindered the development of the interior as well. The agricultural land is situated mainly around the upper stream of the Tana and the Umba, and yields bananas, sugar, rice, corn, and cocoanuts. The principal products exported are ivory, rubber, live animals, and animal products. The annual value of the trade amounts at present to over $1,600,000, of which nearly $1,400,000 represent imports. The territory is making slow progress and the commerce has not materially increased since the territory was first put under the administration of the Crown, a fact due in part to the instability of the British rule and the frequent disturbances with which the British military force is unable to cope. The protectorate is administered by a commissioner, who is also the British agent at Zanzibar. The rule of the British Government extends only along the coast and in the vicinity of the Uganda Railway. In the interior the natives are very little interfered with, and daring raids on caravans almost in view of English forts are by no means rare occurrences. The Uganda Railway was completed in 1901 to Kisumu, on Lake Victoria Nyanza, 572 miles. The population of the protectorate is estimated at 2,500,000. It consists mainly of numerous tribes of Bantu and Hamitic origin. The latter confine themselves mainly to agriculture and are generally subject to the nomadic herdsmen of their own race. The number of Europeans is about 450, and there are about 25,000 Asiatics, mostly Arabian merchants and Indian coolies imported for the Uganda Railway. The capital and the largest town is Mombasa, with a population of about 27,000.

The British East Africa Protectorate was constituted in 1895 as an administrative division of British East Africa, the other division being the Uganda Protectorate (q.v.), which was organized in 1894. For about seven or eight years previous the region had been under the control of the Imperial British East Africa Company. Treaties delimiting the British sphere of influence were made with Germany in 1886 and 1890, and with Italy in 1891. Consult: Purvis, *Handbook of British East Africa and Uganda* (London, 1900); *British Empire Series* (London, 1899); *The Rise of Our East African Empire* (London, 1893); Lugard, *British East Africa and Uganda* (London, 1892).

BRITISH ECONOMIC ASSOCIATION. An association founded in London in 1890, mainly for the purpose of stimulating economic studies through the publication of a quarterly journal known as *The Economic Journal*, of which Prof. F. T. Edgeworth, D.C.L., All Souls College, Oxford, and Mr. Henry Higgs, the secretary of the association, are editors. Mr. Goschen has been its president from the beginning, and it numbers among its vice-presidents Mr. Bryce, Mr. John Morley, Mr. Balfour, and others well known in public life. *The Economic Journal* is the foremost economic publication in scientific value in the British Empire and represents all shades of economic opinion. The association holds no regular scientific meetings, but gives an annual dinner in London, at which the near-by members come together.

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BRITISH EMPIRE. Under this designation are included all the territories united under the Crown of Great Britain and subject to the ultimate control of the Imperial Parliament at Westminster. Round the United Kingdom of Great Britain and Ireland, as a nucleus, are grouped a large number of dependencies in all quarters of the globe, which may be divided into five classes, according to the degree of self-government possessed by each. (1) The first class would comprise those States in America, Australasia, and Africa, which enjoy the fullest measure of autonomy as far as this may be assured by an independent legislature and judiciary, subject only to the limited control which the Crown, as executive, may see fit to exercise through its representatives, the Governors of the separate colonies. Under this head would come Newfoundland, the Bahama Islands, Barbados, and the Bermuda Islands, in the Western Hemisphere; the new-born Commonwealth of Australia and New Zealand, in Oceanica, and Cape Colony and Natal, in South Africa. In every one of these dependencies the lawmaking power is vested in a representative legislature acting in coöperation with an executive appointed by the Crown. In theory the Crown may disallow any law enacted by the colonial Parliaments, but, in accordance with the well-established principles of English policy regarding the relations of the legislature and the executive, the right of veto is practically in abeyance or exercised only in case where evidently the interests not merely of a single colony, but of the entire Empire, are at stake. (2) The second class of dependencies embraces the colonies in which the lawmaking power is vested in a Governor and a single-chambered legislative council, the latter composed, in most cases, partly of nominees of the Crown and partly of representatives elected by the people. This group would include the Channel Islands; Malta and Cyprus, in the Mediterranean Sea; Ceylon and Mauritius, with its dependencies, in the Indian Ocean; and, in America, Jamaica, the Leeward Islands, and Guiana. (3) A grade below are those dependencies which are ruled by a Governor and a council nominated entirely by the Crown. In these the element of representative government is entirely absent. To this category belongs the richest possession of the British Crown, the Empire of India, which is ruled by a Governor and a nominated legislative council in India, acting under the supervision of the Secretary of State for India and a council appointed by him in Great Britain. Other possessions of the same rank are the Crown colonies of Gibraltar, Aden, and Hong Kong, the Straits Settlements, the islands of Ascension and Saint Helena in the South Atlantic, and a large number of dependencies in Africa, including the Orange River Colony, the Transvaal Colony, Basutoland, Nigeria, the Gold Coast, Lagos, Gambia, and Sierra Leone. In America the list comprises British Honduras, Trinidad, the Windward Islands, and the Falkland Islands. Fiji, in the Pacific Ocean, also belongs in the same class. In each of these colonies the power is vested in a British official, known variously as Governor, High Commissioner, or Administrator, who may or may not be assisted in his functions by an appointed council. Certain of the so-called protectorates are in reality examples of the same type. Such are the East Africa Protectorate and the Central Africa Protectorate, which are directly ruled by British officials, in the one case by the Consul-General at Zanzibar, in the other by a resident. (4) Rhodesia and British North Borneo are at present the only instances of a type of colony once so important in the imperial scheme of Great Britain—a dependency, namely, which is administered by a trading corporation whose rights are based upon treaty relations with the native chiefs, and which acts under the control of the British Government. Thus in Rhodesia the administrator of the company is assisted in the performance of his duties by the British resident, and in the case of British North Borneo the Governor appointed by the directors of the company must be confirmed by the British Secretary of State for the Colonies. (5) Finally there are the British protectorates, possessions in which the native government has been left intact, but made merely the machine for the execution of the will of Great Britain. In each case a British official is set by the side of the native authorities with ample power to restrain all acts deemed hostile to British interests or the welfare of the community, and, in the last resort, to assume the government himself. To this last class belong the native States of India; the country of Sikkim, in the Himalayas; the island of Socotra and the Bahrein Islands, in the Persian Gulf; Zanzibar, the Somali Coast, Bechuanaland Protectorate, and Uganda Protectorate, in Africa; and the Tonga or Friendly Islands, in the Pacific.

Owing in great measure to the dispersion of the British territories all over the globe, to the heterogeneous elements of population within them, and to the diversity in the form of government and the degree of autonomy enjoyed by the various classes of colonies, the name British Empire does not connote as definite an entity as does, for instance, the term Russian Empire. In fact, the conception of empire is new to the minds of most Englishmen, who have been used to look upon the colonies as held together more by the ties of race, language, and commerce than by a common subservience to a sovereign metropolis. In those colonies especially where the British race is in the ascendency, as it is in the Commonwealths of Australia and Canada, there has been little disposition on the part of the mother country to obtrude her suzerainty in any obnoxious form; and so loose, indeed, are the ideas of empire still, that many Englishmen regard with complacency the possibility of the establishment of independent States in Canada and Australia, believing that the bonds of common interests would be a sufficient substitute for the loose political ties now existent.

Within the last two decades, however, the name British Empire received a new meaning through the activity of the so-called Greater Britain Party, whose efforts to build up in England a consciousness of imperial greatness and of the destiny of the British race have been materially aided by the events connected with the war against the South African republics.

The case of Egypt, which, nominally under Turkish suzerainty, is in matters of defense, finance, and to a great extent of foreign relation, controlled by British policy, may serve as an illustration of the vagueness connected with the appellation British Empire. Though officially the country is in no way subordinate to Great Britain, and should not for that reason be

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BRITISH POSSESSIONS

POSSESSION	Area Sq. Miles	Population
EUROPE		
United Kingdom of Great Britain and Ireland	121,000	41,454,724 (1901)
Isle of Man	220	54,758 "
Channel Islands	75	95,841 "
Gibraltar	1⅞	27,460 "
Maltese Islands	117	183,679 (1900)
Cyprus	3,584	237,022 (1901)
ASIA		
Empire of India	1,560,000	294,242,000 "
Andaman and Nicobar Islands	2,394	24,500 "
Straits Settlements	1,500	572,250 "
Singapore	200	228,555 "
Penang, Prov. Well'y, etc.	600	248,207 "
Malacca	700	95,487 "
Protected Malay States	34,000	676,138 "
Aden	75	41,222 "
Perim Island	5	
Kuria-Muria Islands	20	
British Somaliland	68,000	
Socotra Island	1,380	est. 12,000 "
Mauritius Islands	700	370,400 "
Rodrigues Island, Seychelles and Amirante Islands, Oil Island, etc.	300	
Ceylon	25,300	3,576,990 "
Maldive Islands	115	est. 30,000 "
Labuan	30	est. 5,853 (1891)
North Borneo	30,000	est. 175,000 (1901)
Hong-Kong	30	297,212 "
AUSTRALASIA		
Commonwealth of Australia	3,000,000	3,767,443 "
New Guinea (part) and Isles	90,000	est. 350,000 "
New Zealand	104,500	772,719 "
Fiji Islands	7,500	117,870 "
Western Pacific Islands, including the Tonga group, part of the Solomon Islands, Gilbert, Ellice, part of New Hebrides, Union, Cook and Monahiki Islands, and smaller groups	.....	
AMERICA		
The Dominion of Canada (land area)	3,050,000	5,338,883 "
Newfoundland	42,000	216,615 "
Labrador	120,000	3,634 "
British Guiana	100,000	294,943 (1900)
British Honduras	7,562	36,998 "
Bermuda Islands	18	17,535 (1901)
Bahama Islands	5,450	53,735 "
Leeward Islands	700	127,434 "
Windward Islands	500	156,472 (1900)
Jamaica, Turks and Caicos Islands	4,400	est. 750,454 (1901)
Barbados	166	est. 195,000 (1900)
Trinidad and Tobago	1,754	272,000 "
	114	
AFRICA		
Cape Colony	292,000	est. 2,350,000 (1901)
Basutoland	10,000	est. 250,000 "
Natal	30,000	929,970 (1900)
Bechuanaland Protectorate	.....	est. 200,000 "
Orange River Colony	48,000	207,503 (1890)
Transvaal Colony	119,000	1,094,156 (1898)
Rhodesia — British South Africa Co.'s Territory	.....	est. 470,128 (1901)
British Central Africa Protectorate	42,000	est. 900,000 "
East Africa Protectorate	.....	est. 2,500,000 (1900)
Zanzibar and Pemba	1,000	est. 200,000 (1901)
Nigeria, Northern and Southern	500,000	est. 30,000,000 "
Gold Coast Colony	40,000	est. 1,500,000 "
Lagos	30,000	est. 1,500,000 "
The Gambia	4,000	90,404 "
Sierra Leone	30,000	est. 100,000 "
SOUTH ATLANTIC		
Ascension Island	35	est. 430 "
St. Helena	47	9,850 "
Tristan d'Acunha	50	est. 64 (1897)
Falkland Isl'ds and South Georgia	7,500	est. 2,043 (1901)

included under the term British Empire, it would by no means be entirely wrong to regard it as such, if it be considered that the British Government exercises much greater influence upon Egyptian affairs than upon the affairs of such members of the empire as Australia or Canada.

The territories under British rule or control embrace about 11,000,000 square miles, or one-fifth of the land surface of the globe, an area exceeding that of the Russian Empire by more than 2,000,000 square miles. The population of the British Empire is, in round numbers, 400,000,000, or about one-fourth of the total population of the globe.

BRITISH GUIANA. See GUIANA.

BRITISH GUM. A name given commercially to dextrin (q.v.).

BRITISH HONDURAS. A Crown colony of Great Britain in Central America (Map: Central America, C 2). It is bounded by Guatemala on the south and west, Mexico on the northwest, and the Caribbean Sea on the east, and covers an area of 7562 square miles. The coast is, as a rule, low and swampy, and a large part of the interior is covered with forests yielding large quantities of mahogany and logwood. The climate is hot and moist, and is very unhealthful for Europeans. The principal agricultural products include coffee, bananas, and cocoanuts. The exports consist mainly of woods, rubber, fruit, and sugar. The annual value of exports and imports is $1,300,000 and $1,200,000, respectively. About 50 per cent. of the commerce is with Great Britain. The revenue is derived chiefly from taxes, duties, and sale and letting of Crownlands. The revenue very seldom covers the expenditures, thereby necessitating a grant from the home Government. The budget at present appropriates $290,000, and the public debt amounted at the end of 1900 to $169,164. There are 50 schools in the colony, almost all of them denominational and supported by the Government. The colony is administered by a Governor, and has an executive council, consisting of 3 official and 2 unofficial members, and a legislative council, consisting of 3 official and 5 unofficial members, all appointed by the sovereign. United States gold currency was adopted as a legal tender in 1894. Population, in 1891, 31,471, of which only 400 were whites, the rest being negroes, mulattoes, and Indians; in 1901, estimated at 37,500. The capital, Belize, is a busy port, with an extensive shipping and a population of about 9000. The colony was first settled at the beginning of the Eighteenth Century by the Scotch adventurer Wallis, from whom it is supposed to have received its original name of Belize (Balize). Spain made numerous attempts to expel the early British settlers from the colony, and it was not until 1783 that a treaty was concluded recognizing the sovereignty of Great Britain. From 1862 to 1884 the colony was administered as a dependency of Jamaica. In 1884 it was created a separate colony.

BRITISH INDIA. A term used to designate the districts of India under direct British administration, in contradistinction to the whole territory, inclusive of the native States under British protection. See INDIA.

BRITISH MUSE'UM. An important national institution in London. By the will of

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Sir Hans Sloane (q.v.), his great natural history and art collections, with a large number of books and manuscripts, were in 1753 offered to the Government for £20,000, the first cost having been over £50,000. The necessary funds were raised by a lottery, and the collection, together with the Harleian and Cottonian libraries (the latter of which, presented to the nation in 1700, was the real beginning of the museum), were arranged in Montague House, which was bought for the purpose. The institution was opened in 1759, under the name which it now bears. The acquisition of new collections made enlargement necessary; and finally, in 1823, the eastern wing of the present building was erected, to receive the library of George III. The completion of the structure was delayed until 1847. It is a hollow square, Ionic in architecture, with an imposing façade 370 feet long on Great Russell Street, flanked by the residences of the chief officers. The principal subsequent addition was the splendid reading-room erected within the quadrangle (1854-57), at a cost of £150,000. It is circular in form, with a dome 106 feet in height and 140 in diameter. The library of the museum contains over three miles of bookcases, eight feet high, which is equivalent to space for 1,000,000 octavo volumes. The reading-room proper in the dome contains 60,000 more. It has accommodation for 200 readers, and in details of arrangement, ventilation, etc., is admirably adapted to its purpose, thanks very largely to the unwearying care of Sir Antonio (then Mr.) Panizzi (q.v.), the principal librarian, during its construction. When the natural-history departments claimed more space, a new building was erected for their exclusive use in Cromwell Road, near the South Kensington Museum, at a cost of nearly £400,000. To this, which has been in use since 1881, the zoölogical, mineralogical, geological, and botanical departments were transferred, all very rich in specimens and constantly increasing. The main building was also considerably enlarged in 1873 and 1888, for the benefit of the departments of Greek sculpture and of prints; and several acres of ground adjoining were secured in 1895 for future extension.

Only a brief account can be given of the wealth of collections contained in the museum. They were originally arranged in three departments—printed books, manuscripts, and objects of natural history. There are now eight in the museum proper.

Printed Books.—This is the largest department, and, from Sir Hans Sloane's original collection of 50,000 volumes, has grown to enormous proportions, by purchase, bequests, and donations. Under the Copyright Act of 1842, it receives a copy of every book published in England. The annual increase from all sources is nearly 50,000 volumes, and the total number of printed books is now about 2,000,000, exceeded only by the Bibliothèque Nationale in Paris. The old manuscript catalogue, which used to extend to some 3000 volumes, has at last been superseded by a printed one, begun in 1881 under the supervision of the learned librarian, Dr. Garnett, and requiring about 600 volumes. The most extensive and valuable additions have been the royal collections given by the last three Georges, David Garrick's collection of plays (1779), the natural-history library of Sir Joseph Banks (1820), and the Grenville collection (1847). Over 50,000 printed and 20,000 manuscript maps form a special sub-department. Access to the library is granted by the issuing of a reader's ticket, on a written application accompanied by the recommendation of a householder. The total number of persons using the reading-room in 1900 was 198,566.

Manuscript Department.—This now contains upward of 55,000 volumes, besides charters, seals, and Egyptian, Greek, and Roman papyri. It includes the Cottonian manuscripts (see COTTON, SIR ROBERT BRUCE), rich in documents relating to English history; the Harleian collections (see HARLEY, ROBERT), specially rich in illuminated and classical manuscripts; those from the royal library given by George II. in 1757, and containing, among other very valuable things, the Codex Alexandrinus (q.v. under BIBLE); the Basilicon Doron of James I. in his own handwriting; and many priceless literary autographs. The most important recent additions to this department are the Stowe manuscripts, purchased from Lord Ashburnham, and 430 volumes of the Duke of Newcastle's papers.

There is a separate department of Oriental printed books and manuscripts, established in 1892; and the former antiquities department, dating from 1807, was in 1861 divided into the three which follow.

Greek and Roman Antiquities.—Sir Hans Sloane's small collection was the nucleus of this department, which for a number of years made slow progress. In 1772, by the purchase of Sir W. Hamilton's collections, a number of important vases were secured, and at the end of the same century the Dilettanti Society (q.v.) gave the results of their expedition to Ionia. In 1805 the collection of Græco-Roman sculpture formed by Charles Townley was purchased for £20,000, to be followed in 1814 by the Townley collection of bronzes, gems, and coins. In the same year the frieze of the temple of Apollo at Bassæ (see PHIGALIAN MARBLES) was purchased. It was, however, in 1816 that the most valuable accession reached the museum, in the shape of the Elgin Marbles (q.v.), purchased for £35,000, and including the statues and reliefs from the Parthenon. Since then the display of sculpture has been increased by the Lycian monuments brought back by Sir Charles Fellows (1842), and by the results of the excavations at Halicarnassus, Cyrene, Ephesus, and Priene, as well as by the purchase of collections and single monuments. To the vases and small objects have been added the Burgon and other collections, including a valuable series of vases from Camiros and Naucratis. The collection of gold, silver, and gems was greatly enriched by the addition of the Castellani collections in 1872-73.

Coins and Medals.—This, whose beginning came from the Cotton and Sloane collections, has grown to be a large and interesting department, arranged as Greek, Roman, Mediæval and Modern English, and Oriental. In 1872 £10,000 were spent in purchasing the finest Greek and Roman specimens of the Wigan collection.

Egyptian and Assyrian Antiquities (until 1881 called Oriental Antiquities).—This collection began with the antiquities which fell into British hands at the capture of Alexandria in 1801; but its most valuable acquisitions date from the middle of the century, and are due to

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Layard, Rawlinson, George Smith, and other famous explorers. It is now a singularly complete and varied collection of Egyptian, Babylonian, Assyrian, Phœnician, and Semitic antiquities.

British and Mediæval Antiquities and Ethnographic Collections.—This was made a separate department in 1866, and contains all objects of this nature found in the British Isles, and others which throw light on life in the Middle Ages. The Christy and Slade collections have added much to its value.

Prints and Drawings.—This magnificent collection, one of the most complete and valuable of its kind, is arranged in schools, according to the different styles of national art, now including the Japanese, and comprises original drawings of the old masters, etchings, and engravings. The most recent addition of prominence is the famous collection of Mr. John Malcolm.

The expenses of the maintenance and enlargement of the museum are paid out of the national treasury, the grants amounting sometimes to as much as £150,000. The whole system of arrangement facilitates the use of its collections by students; excellent catalogues and handbooks exist, and, as far as possible, all objects are clearly labeled. Its educational value is very great, and that it is appreciated is shown by the fact that in 1900 the visitors to the museum (exclusive of readers) numbered 689,249, of whom 43,892 went there on Sunday afternoons.

BRITISH NAVY. See NAVIES.

BRITISH SOMALILAND, sô-mä'lê-länd. A British protectorate on the Gulf of Aden, extending from about longitude 43° to 49° E., and bounded inland by Italian Somaliland (q.v.) and Abyssinia (Map: Africa, J 4). Its present area, after the agreement with Abyssinia in 1897, is estimated at about 68,000 square miles. The part along the coast is generally flat, while the interior is covered with mountains mostly of volcanic formation and rising in some cases above 6000 feet. The deficiency of rivers is largely responsible for the poor vegetation which characterizes the whole territory. The climate is moderate and healthful in the more elevated regions and somewhat moist in the vicinity of the coast. The principal products exported are cattle, sheep, ostrich-feathers, skins, hides, and gum. Transportation is effected chiefly by camels and donkeys. The principal commercial ports are Berbera, Bûlhar, and Zeyla. The annual value of the trade amounts to about $2,500,000, almost evenly divided between imports and exports. A considerable part of the trade comes from inland, and it is the general opinion that the completion of the Jibutil-Harar Railway line will affect it unfavorably in view of the inadequate transportation facilities of British Somaliland. The protectorate of Somaliland was created in 1884, and was under the control of British India till 1898, when it was put under the direct control of the Crown. It is administered by a consul-general, and the three main ports are under the supervision of British officials. The capital is Berbera. Accurate information about the population is unavailable, as it is mostly nomadic. The Somali are of Hamitic origin and profess Mohammedanism. Consult: Swayne, *Seventeen Trips Through Somaliland* (London, 1900); Peel, *Somaliland* (London, 1899); Hendebert, *Au pays des Somalis et des Comoriens* (Paris, 1901).

BRITISH WEST INDIES. A political division of the West Indies, comprising Jamaica and almost all the smaller islands of the Antilles, with the exception of the few small islands belonging to France, Denmark, and the Netherlands. They are divided into the following six groups:

GROUPS	Area	Pop.
Bahamas	5,450	53,735
Barbados	166	192,000
Jamaica with Turks Islands	4,424	639,491
Leeward Islands	701	127,434
Trinidad with Tobago	1,868	281,917
Windward Islands	500	160,296
Total	13,109	1,454,873

These groups are subdivided into administrative units with different forms of government. The chief means of subsistence with all of them is agriculture, sugar and fruit constituting the staple products. The population consists mostly of negroes and mulattoes. For more details, see articles on the separate islands and groups. Consult: Jay, *A Glimpse of the Tropics* (London, 1900); Fiske, *History of the West Indies* (New York, 1899); Root, *The British West Indies and the Sugar Industry* (London, 1899); *Report of the West India Royal Commission* (London, 1897); Rodway, *The West Indies and the Spanish Main* (London, 1896).

BRITO FREYRE, brē'tô frā'rā, FRANCISCO DE (c.1620-92). A Portuguese soldier, naval officer, and historian. He became a captain of cavalry in the land forces, and in 1663 and 1665 commanded the fleet in the war which culminated in the expulsion of the Dutch from Brazil. He is best known for his *Nova Lusitania, Historia da Guerra Brazilica* (Lisbon, 1675), a rare and important work.

BRIT'OMAR'TIS (Gk. Βριτόμαρτις, translated by later Latin authors *virgo dulcis*, sweet maiden, from Cretan *brity*, rich in blessing + *martis*, maiden). A Cretan female deity. Greek myth holds her to have been originally a nymph who drowned herself to avoid the embraces of Minos and to have been, thereupon, apotheosized by Artemis. Like the latter, she came to be regarded as the virgin patron of the chase, and as such is used by Spenser in the *Faerie Queene* to symbolize, in the form of a chaste huntress, the brave and single Queen Elizabeth.

BRITS'KA (Russ. *britchka*, Pol. *bryczka*, dim. of *bryka*, a freight-wagon). A long four-wheeled pleasure carriage, in use in Russia and Poland, so constructed as to give space for reclining at night, when used on a journey. The Polish britska, employed also in Russia, has a pole, a body of wickerwork, and a leather top.

BRITTANY, or **BRETAGNE,** bre-tä'ny' (from the *Bretons*, its inhabitants). A peninsula of triangular form in the northwest of France, anciently a Roman province, subsequently a duchy, afterwards again a province, and now comprised in the departments of Finistère, Côtes-du-Nord, Morbihan, Loire-Inférieure, and Ille-et-Vilaine. It has the English Channel

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on the north, the Bay of Biscay on the south, and the Atlantic Ocean on the west. The boundaries on the land side are the old provinces of Normandy, Maine, Anjou, and Poitou. The ancient duchy was diagonally divided from northwest to southeast into the Haute and Basse Bretagne (Upper and Lower Brittany), the capitals of which were respectively Rennes and Vannes. The coast generally rises in rugged and lofty cliffs, but is indented with numerous bays which afford ample commercial advantages. Saint-Malo, Saint-Brieuc, Brest, Quimper, Lorient, and Nantes are important seaports. From the Montagnes d'Arrée and the Montagnes Noires, masses of granite in the northwest, the modern designation of Côtes-du-Nord — Northwest Hills — is derived. While not exceeding a height of 1280 feet, they give to the peninsula a bold and imposing appearance. The centre of the country is formed chiefly of clay slate. The scenery is varied and beautiful, and although the winter months are marked by fogs and violent wind-storms, the climate generally is dry, bracing, healthful, and favored with much sunshine.

Large tracts of land lie uncultivated; but in the well-watered valleys, along the numerous rivers, and especially in the northern parts, modern methods yield abundant crops of all kinds, railway and steamboat transportation facilities giving a great impetus to agriculture. In the west and southwest agriculture is still in a primitive state, and there the tenacity with which the Breton clings to the customs and beliefs of his forefathers is especially apparent by his retention of the Celtic language rich in folklore and an individual literature, and by his quaint, picturesque, and multi-colored costume of the Sixteenth Century, always in evidence on Sundays, and at festivals and fairs. The legends and traditions of the marvelous which still influence the simple, superstitious native nature, are enhanced by the stupendous megalithic monuments of the paleolithic age which abound on the plains of Carnac, at Locmariaquer, Dol, and other localities throughout the region—relics of the pagan religion which existed as late as the Seventeenth Century, ritual traces of which secretly survive in remote parts. The Bretons are an Alpine or Celtic people, classed by Deniker, *Races of Europe* (1900), as dark, very brachycephalic, and short, and called by him the Western or Cévenole race (cranial index, 82.7; height, 1.63 metres). They have brown or black hair, light or dark-brown eyes, rounded faces and thick-set figures. Traversed by railroads and fine highways, Brittany is a great resort for tourists—cyclists and automobilists especially being attracted by the combination of beautiful scenery and the archaic atmosphere of ancient monuments, castles, cathedrals, churches, and picturesque, if not particularly clean, villages.

HISTORY. In ancient times Brittany, under the name of Aremorica (Armorica), was the seat of the confederated Armorican tribes, who were of Celtic and Kymric origin. Traces of them remain in the old Kymric dialect of the three most westerly departments, and in the numerous so-called Druidical monuments already mentioned. Under the Romans, the country was made the *Provincia Lugdunensis Tertia;* and for two centuries was prosperous under the 'Roman peace.' But in the disorders of the Third Century A.D. it suffered severely, and was reduced almost to a wilderness. It was repeopled by numerous immigrations from Great Britain caused by the Anglo-Saxon invasions of the Fifth and Sixth centuries, and then its name was changed from Armorica to Brittany — *Britannia Minor.* Monasteries were built and settlements arose about them. Soon the Franks came into collision with the Bretons. From the time of Clovis to the death of Charlemagne there were frequent wars in which the Bretons were usually defeated, but never subdued. They paid tribute only when compelled by an armed force. Louis the Pious placed a native chief, Nomenoë, over the country in 818, and under his rule it prospered. After the battle of Fontenay, 841, Nomenoë took advantage of the weakness of the Carolingian monarchs to establish his independence, which was recognized in 846. From this time the rulers claimed the title of 'Duke by the grace of God.' Brittany suffered severely from the invasion of the Northmen, but won a temporary respite by a brilliant victory in 891, when of 15,000 Northmen only 400 escaped. After 907, however, the Northmen renewed their attacks and reduced the country to the same desperate condition in which it had been in the Fourth Century, 'Brittany destroyed.' in the words of the contemporaries. Alain of the Twisted Beard (died 952) drove out many of the Northmen, but the country remained a prey to civil strive. In 992 Geoffrey, Count of Rennes, an ally of the Normans, took the title of Duke, though the French King refused to acknowledge the legitimacy of the title till 1213. After the Tenth Century Brittany was closely associated with Normandy, and many Britons took part in the conquest of England. Under Henry II. of England, the Duke had to flee to England, and Henry took advantage of the opportunity to make his son Geoffrey Duke of Brittany in 1169. Geoffrey soon became the ally of the King of France against his own father. His posthumous son, Arthur, was the unhappy prince whom Richard the Lion-Hearted declared his heir, and King John was suspected of murdering, in 1203. After that Brittany became a vassal State of France, and in spite of frequent revolts, remained so until about 1338. Then when war broke out between England and France, the French King was glad to secure the Duke's aid 'as an ally, not as a subject.' During the Hundred Years' War Brittany was the ally alternately of each party and suffered exceedingly. The question whether Brittany was a vassal State of France remained undecided and caused many wars. In 1491 the Duchess Anne, heiress of Brittany, married Charles VIII. of France and the duchy was united to France. In 1499, however, when Anne married Louis XII., the successor of Charles VIII., the independence of Brittany was again fully recognized. After long discussion and many treaties, the duchy was declared incorporated with France in 1532 by Francis I. Brittany retained a local parliament until the outbreak of the Revolution. During the Revolution, Brittany, which was intensely loyal to the Bourbons, was the arena of sanguinary conflicts, and especially of the uprising of the Chouans (q.v.), who reappeared as recently as 1832.

BRITTLE, BARNABY. A character in Betterton's comedy *The Amorous Widow.* He is a commonplace, rather vulgar personage, who is deceived by his wife, the title character. The

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rôle was played by Charles Macklin, in the winter of 1750, at Covent Garden.

BRITTLE, MRS. The unfaithful wife of Barnaby and the title character in Betterton's *Amorous Widow.* The part was a favorite with Mrs. Bracegirdle, who in 1706-07, at the Haymarket, chose it to show her histrionic powers, as contrasted with those of Mrs. Oldfield. For the cause and result of the latter remarkable contest, consult: *Life of Mrs. Oldfield,* anonymous (London, 1730); Genest, *Account of the English Stage,* Vol. II. (Bath, 1832).

BRITTLE STARS (so called from being brittle or fragile). A class of starfish-like echinoderms, technically known as *Ophiuroidea,* excluding the basket-fish. The brittle stars are a widely distributed group of animals, like all the echinoderms, exclusively marine; found in all seas, but most abundant in the tropics, and especially in the West Indian region. They are common at all depths, but are especially abundant in comparatively shallow water. None of them reach a very large size, few having the body or disk more than an inch in diameter, and the arms or rays are rarely ten inches in length. In color there is the most extraordinary variety. While some are black, brown, dull olive, or even pure white, others are of the most gorgeous shades of green, blue, red, and yellow, or exhibit the most beautiful combinations of hues. In some the disk is smooth and the arms terete, with very short, flat, and appressed arm-spines; in others, the whole disk is covered with spines, sometimes short and opaque, but often long, slender, and glassy, and the flattened arms bear very long and beautifully transparent arm-spines. In fact, the variety in the shape and covering of the disk and arms is quite as great as is that in color. The arms, though flexible from side to side, are very slightly flexible up and down, and are therefore very easily broken. It is from this circumstance that the name brittle star has arisen. They are usually rather slow-moving animals, with little power of escaping from their enemies, and with no means of defense save such as the spines afford. Accordingly, they live under rocks or buried in mud or sand, where there is little danger of their being seen. A few species, however, show considerable agility in escaping from an enemy, and run about rapidly from rock to rock as they are pursued. They are practically all vegetable feeders or scavengers, though possibly some are carnivorous. About 600 species of brittle stars are known, of which only a few are found along the shores of the United States. About half a dozen forms occur in shallow water along shore, north of Cape Hatteras, but south of that point they become very abundant. The Pacific Coast forms are at present very slightly known.

BRIT'TON. The putative author of the earliest summary of the laws of England in the French language, all earlier treatises having been written in Latin. (See BRACTON.) It was prepared in the last decade of the Thirteenth Century (probably 1292-94), and purports to have been written by the command of Edward I., and speaks in his name. The author of the treatise is unknown, but he was probably a clerk or lawyer attached to the King's Court, who sheltered himself behind the greater writer, whom we know as Bracton, but whose name was variously spelled Bratton, Bretton, or Britton, and whose work was largely drawn upon by the anonymous author of the present compilation. The latter is not a mere transcript of the greater work, however, but an original treatise of considerable value. An incomplete translation by Robert Kelham was published about the middle of the Eighteenth Century, and in 1865 appeared Francis M. Nichols's admirable edition, with an excellent translation, commentary, and learned introduction, published in London. Nichols's translation has been republished in the United States (Washington, 1902), with an introduction by Judge Simeon E. Baldwin.

BRITTON, COLONEL. One of the principal characters in Mrs. Centlivre's comedy *The Wonder a Woman Keeps a Secret,* whose clandestine affair with Isabella is the test of Violante's discretion, thereby suggesting the title of the piece.

BRITTON, HENRY DE. See BRACTON.

BRITTON, JOHN (1771-1857). An English antiquarian. He was born in Wiltshire, and received but a scanty education. In collaboration with E. W. Brayley he compiled a work on *The Beauties of Wiltshire* (Vols. I., II., 1801; Vol. III., 1825), and another on *The Beauties of Bedfordshire.* The most valuable of his numerous publications are *The Architectural Antiquities of England* (5 vols., 1805-26), and an elaborate work, in 14 volumes, on *The Cathedral Antiquities of England* (1814-32).

BRIVES-LA-GAILLARDE, brêv'là-gà'yärd' (Fr., joyful Brive; anciently Lat. *Briva Curretia,* town on the Corrèze, from Celt. *braigh, brig,* heap, pile, elevation). A manufacturing town in the Department of Corrèze, France, on a river of that name, situated about 18 miles southwest of Tulle (Map: France, H 6). It is a beautiful city, with many interesting old houses and several churches (one of which, Saint Martin, dates from the Eleventh Century), a college, and a library. Its industries are muslin-weaving, manufacture of copper and tinware, wax candles, and truffle pâtés, while it has a brisk trade in wool, wine, timber, nuts, and oil. Population, in 1896, 12,800. The Romano-Gallic name of the place was Briva Curretia. It is the birthplace of Cardinal Dubois.

BRIX'EN (It. *Bressano;* anciently Lat. *Brixentes,* Gk. Βριξάντοι, *Briwantai,* probably 'mountaineers,' from Celt. *brig,* elevation, hill). A town of the Austrian Crownland of Tyrol, situated about 1700 feet above the sea-level, and about 60 miles east-southeast of Innsbrück (Map: Austria, C 3). It is an episcopal see, and has a handsome episcopal palace, a fine cathedral, dating from the Fifteenth Century and containing the tomb of the Minnesinger Oswald von Wolkenstein, and several monasteries. The chief industry is the production of wine and the raising of fruit and grain. On account of its mild and healthful climate, it is a favorite spring and autumn resort. About nine miles north-northwest of the town, at the entrance of the defile called the Brixener Klause, is the fortress of Franzenfeste, which commands the Brenner Pass and the entrance to the Pusterthal. Population, in 1890, about 5000; in 1900, 5800. Brixen is mentioned in 901. Since 992 Brixen has been the

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capital of an episcopal see established in the Fourth Century.

BRIX'HAM (AS. *brycg, bricg*, Ger. *Brücke*, bridge + *hām*, Ger. *Heim*, home, i.e. town of the bridge). A market town and seaport of Devonshire, England, beautifully situated on the south side of Torbay, 22 miles south of Exeter (Map: England, C 6). The town occupies the sides of two hills, and is divided into two parts, called Upper and Lower Brixham. The prosperity of Brixham depends chiefly on its fisheries, it being the headquarters of the great Devonshire fishery of Torbay, in which many vessels are employed. There are also iron-mines and lime-pits in the neighborhood. The town is a much-frequented seaside resort. A cave discovered on Windmill Hill in 1858 is famous for the remains of prehistoric animals and men found there. It was at Brixham that the Prince of Orange (afterwards William III.) landed, November 4, 1688. Population, in 1871, 4941; in 1891, 7978; in 1901, 8090.

BRI'ZA. See QUAKING GRASS.

BRIZEUX, brē'zē', JULIEN AUGUSTE PÉLAGE (1803-58). A French poet. He was born in Lorient, Bretagne, and in 1831 published his very successful idyllic poem, *Marie*. Most of his work derives its *motif* from the Bretagne country, and rings freshly and sincerely. He wrote further: *Les Ternaires*, afterwards called *La fleur d'or* (1841); *Les Bretons* (1845), crowned by the Academy; and *Histoires poétiques* (1855). His *Œuvres complètes* were published in 1879-84 (4 vols.).

BRIZURE. brē-zŭr', BRIZÉ, or BRISÉ (Fr. *brisure*, from *briser*, to break). Terms used to indicate that a charge is bruised or broken. See HERALDRY.

BROACH, brōch, or BAROACH (*Barygaza* in the *Periplus* of the First Century A.D., from Skt. *Bhṛgukaccha*, the town of Bhrigu the Seer, from *Kaccha*, river-bank). A town of British India, in the Presidency of Bombay, 190 miles north of Bombay (Map: India, B 4). It is situated on an elevated mound, supposed to be artificial, on the north bank of the Nerbudda, which is here 2 miles wide even at ebb tide, but shallow. The navigable channel is winding and difficult, even at high water—a feature mentioned as early as the First Century A.D. It abounds in fine fish. A stone wall, about 40 feet high, fronts the river-bank, and protects the town from inundation. The streets are narrow, with tall houses. Situated in the midst of a fertile district, for 800 years it was a flourishing town, with a large population; but in consequence of political troubles, and the rise of Surat in the Sixteenth Century, it commenced to decay. Its trade consists chiefly of agricultural products and cotton. Broach was long famous for its manufactures of cloth; but that of the finer kinds declined, owing to the importation of English goods. Many of the weavers of Broach are Parsees, of whom some are of the more opulent classes—as ship-owners and ship-brokers. Broach has a remarkable Brahmanical hospital for sick animals, into which horses, dogs, cats, monkeys, peacocks, and even insects are received. It is ostensibly conducted by a number of Brahmans, who derive a good income from lands devoted to it and from voluntary contributions. Broach belonged to the Kingdom of Guerat, on the overthrow of which, by the Emperor Akbar, it was assigned to a petty Nawab. Falling under the dominion of the Peishwa of the Mahrattas, it was taken by the British in 1772, ceded to Scindia in 1783, in acknowledgment of the kind treatment of some British prisoners, and again stormed by a British force in 1803, since which date it has remained in the possession of the British. Population, in 1891, 40,170; in 1901, 42,300.

BROAD ARROW. An arrow-head which forms the Government mark on British Government stores; also the title of a British semi-official military and naval gazette, founded in 1833 and published weekly in London.

BROAD'BENT, Sir WILLIAM HENRY (1835 —). An English physician and author. He was educated at Owens College, the Royal School of Medicine in Manchester, and in Paris, and was appointed physician to the Western General Dispensary. Subsequently he was physician successively to the London Fever Hospital and Saint Mary's Hospital, and in 1881 became president of the Medical Society of London. From 1888 to 1889, and again from 1895 to 1896, he was censor of the Royal College of Physicians; in 1898-1901 was physician extraordinary to Queen Victoria; and in 1901 became physician-in-ordinary to King Edward VII. He has published *The Pulse* (1890), and *The Heart* (1897).

BROADBILL. A bird having a notable breadth of beak. (1) A scaup duck or 'bluebill.' (See SCAUP DUCK.) (2) The shoveler duck. (See SHOVELER and DUCKS.) (3) A broad-mouth (q.v.).

BROAD-BOTTOM ADMINISTRATION. A name derisively given to the English Ministry formed by Henry Pelham in 1744, because it professed to include in a grand coalition all parties of weight and influence in the State, and comprised no less than nine dukes.

BROADCASTING. A method of sowing which distributes the seed with some degree of uniformity over the surface. When the sowing is done by hand, the seed is carried in a bag at the left side, and is scattered with the right hand while the sower walks. The seed is afterwards covered with a harrow, or by dragging brush over it. Machines devised for sowing grain or other seed in this manner are called broadcast-seeders. The method of sowing by the drill is preferred by many farmers.

BROAD-CHURCH PARTY. A name loosely applied, from about the year 1850 onward, to a group of liberal leaders in the Church of England, of whom Thomas Arnold, Frederick Denison Maurice, Charles Kingsley, Frederick William Robertson, and Arthur Penrhyn Stanley were the most important. In their breadth of view they resemble the Latitudinarians of the Seventeenth Century—Cudworth, Whichcote, and More. The designation 'Broad' churchmen is not wholly satisfactory, and was disavowed by the leaders of the movement themselves. Its historic justification, however, lies in the fact that it describes the tendency toward doctrinal comprehensiveness, long prevalent in the Established Church, which is properly called 'broad,' in distinction from 'high' and 'low' churchmanship. But it should always be borne in mind that the difference between the Broad-Church Party and the other two is less with reference to the doctrine of the

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Church as an institution than with reference to theology proper. It is in the field of doctrinal belief that breadth is most apparent. The members of this school were strongly influenced by the writings of Coleridge and by modern German theology. They were acquainted with the advancing scientific investigation of their time, and aimed to counteract its materialistic tendencies. Maurice is perhaps best known as the theologian, Kingsley as the practical worker and writer, and Robertson as the preacher of the group. In religious aim and method they are akin to certain other liberal leaders of the English Church in the Nineteenth Century, such as Archbishop Whately and the writers of "Essays and Reviews" (q.v.). As champions of an earnest spiritual faith, Christian yet free, the Broad Churchmen have exercised an influence far beyond the limits of their own communion, and their writings have been read not only in Great Britain and America, but also upon the Continent of Europe.

Consult: John Tulloch, *Movements of Religious Thought in Britain During the Nineteenth Century* (London, 1885); John Hunt, *Religious Thought in England in the Nineteenth Century* (London, 1896).

BROAD'HEAD, GARLAND CARR (1827—). An American geologist, born near Charlottesville, Albemarle County, Va. He studied at the University of the State of Missouri and at the Western Military Institute in Kentucky. From 1871 to 1873 he was assistant State Geologist of Missouri, and from 1873 to 1875 was State Geologist. He was a member of the jury on geology at the Philadelphia Centennial Exposition, and in 1881 was a special agent of the tenth census for rendering a report on the quarrying industry of Missouri and Kansas. In 1884 he was made a member of the Missouri River Commission. For ten years, beginning in 1887, he was professor of geology and mineralogy at the University of Missouri. It was he who gave the name to the Ozark series and to the Ozark plateau. He is regarded as an authority on the coal-measures of Missouri, on which he prepared a contribution to the *Transactions* (Vol. II., 1868) of the Saint Louis Academy of Science. He also wrote a valuable report for nine counties of central Illinois in Vol. VI. *Illinois Geological Survey Reports; Geological Survey of Missouri Iron Ores and Coal Fields* (1873); *Geological Survey of Missouri* (1873-74).

BROAD-HEADED SNAKE. See DEATH-ADDER.

BROAD'HURST, HENRY (1840—). An English legislator and labor organizer. The son of a journeyman stone-mason, he began at fourteen to follow his father's trade, and continued in it until 1872. In 1875 he became secretary of the Labor Representation League. He has been especially prominent in English labor movements, and in 1875 was secretary of the Parliamentary committees of the Trades Union Congress. In 1880 he was elected to Parliament for Stoke-upon-Trent; for Bordesley from 1885 to 1886; for Nottingham from 1886 to 1892; and in 1894 for Leicester. He became under-secretary to the Home Office in 1886; and has since served on various commissions appointed to investigate labor questions.

BROADMOUTH, or **BROADBILL.** One of about a dozen species of small birds, distributed from the Himalayas to the Philippines, and characterized by excessive breadth of beak. They constitute a family, Eurylæmidæ, the affinities of which have been long disputed, but the best opinion now regards it as passerine. These birds are no larger than sparrows, inhabit the woods in small flocks, are brilliant in plumage, but songless and lethargic, and are mainly frugivorous; but two species (of the genus Calyptomena) are insect-eaters. These last "are remarkable for their rich green plumage and the way in which the frontal feathers project upward and forward, so as to . . . form a disk-like prominence." See Plate of LYRE-BIRD, ETC.

BROAD RIVER. A stream of North and South Carolina, rising in the Blue Ridge and joining with the Saluda to form the Congaree (Map: South Carolina, C 2). The city of Columbia is at the junction of the two rivers. The country around Broad River is exceedingly fertile and productive. The stream is about 220 miles long and navigable for small vessels about 141 miles above Columbia. It drains an area of 4950 square miles, of which 3550 square miles is in South Carolina.

BROAD-SEAL WAR. See NEW JERSEY.

BROADSIDE, or **BROADSHEET.** A variety of pamphlet, consisting normally of a single large sheet, printed on one side only, and most frequently without division into columns. The broadside flourished chiefly in England, and was in use from the invention of printing for royal proclamations, Papal indulgences, and similar documents. It made a considerable figure throughout western Europe, about the middle of the Sixteenth Century, in times of political agitation. In England it was very largely used for popular ballads, which were hawked about the streets. During the first ten years of Elizabeth's reign the names of no less than forty ballad-printers appear in the Stationers' Registers; but comparatively few specimens have been preserved from the reigns of the Tudor sovereigns or of James I. The broadside, as representing an outburst of popular feeling, was more commonly employed during the Civil War, and seems to have reached its culminating point in the time of James II. From that period, with the increase in the number of newspapers and the liberty of the press, it gradually died out, though still numerous even under the Georges. The collection of these sheets has always been a favorite pursuit among antiquarians, though never so popular as in recent years. Robert Burton, the author of the *Anatomy of Melancholy*, was one of the earliest collectors. John Selden made a considerable collection of broadside ballads, which passed at his death to Pepys; the diarist had 1800 English ballads, which, bound in five folio volumes, are now in the library of Magdalene College, Cambridge. One of the most famous collections is that known by the name of the Duke of Roxburghe, now in the British Museum, gathered chiefly by Robert Harley, Earl of Oxford, and including 2048 broadsides, bound in three volumes. In 1898 Lord Crawford had, at Haigh Hall, Wigan, something like 19,000. For a minute and scholarly description of the English part of these, consult *Bibliotheca Lindesiana* (Aberdeen, 1898).

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BROAD'STAIRS (formerly *Bradstowe*). A town on the coast of Kent, England, about three miles southeast of Margate (Map: England, H 5). It is a popular summer resort and has a small pier built early in the Sixteenth Century, and an archway leading to the shore supposed to have been erected in 1540. Population, in 1891, 5234; in 1901, 6460.

BROADSWORD. A sword with a broad blade, for cutting only, not for stabbing, and therefore not sharp at the point, like a sabre.

BROAD'US, JOHN ALBERT (1827-95). An American clergyman, born in Culpepper County, Va. He graduated at the University of Virginia in 1850, was professor of ancient languages there from 1851 to 1853, and during this period was also pastor of the Baptist Church in Charlottesville. In 1859 he became professor of New Testament interpretation and homiletics in the Southern Baptist Theological Seminary, which had just been established in Greenville, S. C., but is now located in Louisville, Ky. For many years preceding his death, he was president of the institution.

BROADWAY. The principal thoroughfare of New York, and one of the most important business streets in the world. Beginning at Bowling Green, near the southern extremity of Manhattan Island, it runs north to Central Park, and is thence continued by the extension formerly called the Boulevard, now a part of Broadway, to the upper part of the island. Broadway is practically a continuous road to Albany and bears the same name in many of the Hudson River towns through which it passes. The first grant of a lot on Broadway was made in 1643 to Martin Kregier, whose tavern, at the present No. 9, later became Burns's Coffee House, and subsequently the Atlantic Gardens. In the early part of the Nineteenth Century, various portions of Broadway, then only some two miles long, became in turn the fashionable residence section of the city. Now the street below Central Park is given up almost exclusively to business. Below Chambers Street it has many 'skyscrapers,' housing the offices of great corporations. Then follows the wholesale dry goods district, which at Eighth Street gives way to the shopping district, followed above Twenty-third Street by the great hotels and theatres. From Fiftieth Street north the street is more and more given over to apartment-houses. A part of the rapid-transit subway of New York has been excavated under the surface of Broadway.

BROAD-WINGED HAWK. See BUZZARD.

BROB'DINGNAG'. A strange land described in Swift's *Gulliver's Travels* (1726). The inhabitants of this wonderful country are represented as giants, about 'as tall as an ordinary spire-steeple.' Everything else is on the same enormous scale, whence the adjective *brobdingnagian* has arisen as a synonym of gigantic. The name is frequently, though incorrectly, spelled *Brobdignag*. Swift wrote a mock letter from Captain Gulliver to his cousin Sympson, purporting to be dated April 27, 1727, but first published in 1735, in which complaint was made that Brobdingnag had been wrongly printed for Brobdingrag, but this was only a feint to mystify the public. See SWIFT, JONATHAN.

BRO'CA, PAUL (1824-80). A French anthropologist, born at Sainte-Foy-la-Grande, Gironde. He studied at the Communal College of Sainte-Foy and the Ecole Polytechnique and Faculté de Médecine of Paris, became in 1846 assistant in anatomy to the Faculté, in 1848 prosector, and subsequently professor of surgical pathology. At various times he also held appointments as surgeon to important hospitals, including La Pitié and La Salpêtrière. In 1847, when he was connected as medical assistant with a commission for the preparation of a report on excavations in the Church of the Celestins, he began a thorough study of anthropology. In 1859, amid difficulties caused by the hostility or indifference of other scientists and by the opposition of the Government, which suspected political plots, he founded the Anthropological Society of Paris. From the formation of this society, officially authorized in 1861, modern anthropological science may be said to date. Broca established in 1872 the *Revue d'Anthropologie*, among the foremost periodicals of its class, in which many of his own works originally appeared. Finally he founded, in 1876, at Paris, the well-known Ecole d'Anthropologie, equipped with laboratories, a library, and a well-stocked museum. Among its numerous courses was one by himself on the comparative anatomy of the primates. The society, the school, and the laboratories are now known under the collective title of the Anthropological Institute. During all this time Broca was constantly occupied with researches, many important results of which were published in *Instructions générales pour les recherches anthropologiques* (1865) and *Instructions craniologiques et craniométriques* (1875). In 1861 he made and announced his noteworthy discovery of the seat of articulate speech in the third convolution of the left frontal lobe of the brain, since commonly called the 'convolution of Broca.' Disease in this convolution, cutting off the blood-supply from it, or severing the fibres that lead from it to other parts of the brain, causes inability to make the effort needed to pronounce words or to read aloud. (See APHASIA; NERVOUS SYSTEM.) The importance of Broca's contributions to anthropology cannot be overestimated.

Broca's activities were many-sided. He was one of the three directors of public assistance through the Franco-Prussian War, and from 1880 a permanent Senator. He was also interested in literature and æsthetics, and has been described as an attractive raconteur and conversationalist. His friend and colleague, M. Jacques Bertillon, is quoted as having said of him, "Rarely has there been a mind so active, so equally open to all kinds of knowledge, and so equally fond of all kinds." His energy as both teacher and writer was truly enormous. Besides numerous memoirs on a wide range of subjects, and an extensive list of contributions to the *Bulletins* of the Anthropological Society and the *Revue d'Anthropologie*, he published the celebrated work, *Des anévrysmes et de leur traitement* (1856); *L'ethnologie de la France* (1859); *Recherches sur l'hybridité animale en général et sur l'hybridité humaine en particulier* (1860); *Traité des tumeurs* (1865-69); *Mémoires sur les caractères physiques de l'homme préhistorique* (1869); and *Mémoires d'anthropologie* (4 vols., 1871-83). Consult *Correspondance de Paul Broca* (2 vols., Paris, 1886). A statue of him by Choppin was placed in the Ecole de Médecine in 1887. Consult the biography by Pozzi (Paris, 1880).

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BROCADE' (Sp. *brocado*, It. *broccato;* cf. Fr. *brocher*, to stitch, embroider). A silken fabric on which a figure is formed by the threads of the warp or woof being raised by the Jacquard loom or other means so as to produce the required pattern. The word has much the same application to silk textures that damask has to linen textures or to worsted textures for upholstery uses. Brocatelle is a kind of imitation brocade made of cotton or silk and cotton. (See DAMASK.) Brocades have been manufactured in Oriental countries since very remote times, and in Europe since the Thirteenth Century. The earlier brocades were very generally composed in part of gold and silver threads. See WEAVING.

BROCAGE, brōk'*a*j. See BROKER.

BRO'CATEL. See BROCADE.

BROCCHI, brōk'kē, GIOVANNI BATTISTA (1772-1826). An Italian naturalist. He was born in Bassano, studied in Pisa, Rome, and Venice, and was professor of botany in Brescia, but devoted himself largely to geology. In 1809 he was made inspector of mines in Milan. In 1822 he went to Egypt, and two years later Mehemet Ali made him one of a commission to organize the Province of Senar; but he soon fell a victim to the climate of Khartum. He published several important works on archæology, mineralogy, agricultural chemistry, and botany.

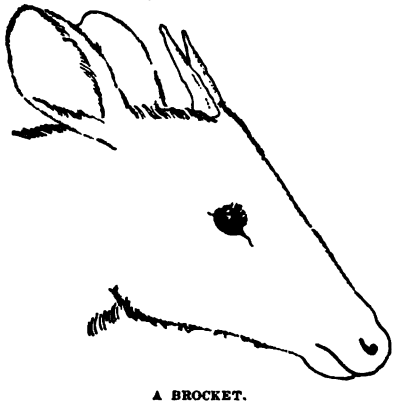
BROC'COLI. See CAULIFLOWER.

BROCK, Sir ISAAC (1769-1812). An English soldier, known as the 'Hero of Upper Canada.' He was born on the island of Guernsey, entered the British Army as an ensign at the age of 15, and rapidly rose by purchase, in accordance with the custom of the time, to the rank of lieutenant-colonel. He commanded his regiment in the expedition to North Holland in 1799, participating in the battle of Egmont-op-Zee, and subsequently, on board the fleet of Parker and Nelson, in the naval battle of Copenhagen. He served in Canada from 1802 to 1805, when he went to England on leave; but returned in 1806, on account of the threatened hostilities between England and the United States, and commanded for a time at Quebec. In 1810 he was placed in command of all troops in Upper Canada, and in addition was soon afterwards appointed provisional Lieutenant-Governor of the province. In 1811 he was raised to the rank of major-general. Upon the outbreak of the War of 1812 he made energetic preparations to repel the threatened invasion of Canada by an American force under Gen. William Hull, and on August 16, 1812, captured Detroit, Hull surrendering, against the remonstrances of his officers, without offering any substantial resistance. (See HULL, WILLIAM.) For this success Brock was made an extra Knight of the Bath. On October 13, during the American attack upon Queenstown, he fell mortally wounded at the head of his troops, his last words being, "Never mind me; push on the York Volunteers." Soon after his death a public monument was erected in Saint Paul's, London, with money appropriated by the House of Commons. Brock was buried in one of the bastions of Fort George, but in 1824 his remains were removed to Queenstown Heights, where a monument costing £3000 had been erected by order of the Provincial Legislature. This monument was destroyed by a fanatic in 1840; and in July, 1841, a mass-meeting, attended by more than 8000 people, and presided over by the Lieutenant-Governor of Upper Canada, was held on the Heights, and the sum of £5000 was voted for the erecting of a new memorial. The present monument is a tall shaft surmounted by a statue of Brock. Consult Tupper, *Life and Correspondence of Sir Isaac Brock* (London and Guernsey, 1845; 2d edition, much enlarged, 1847).

BROCK, THOMAS (1847—). An English sculptor. He became a pupil of J. H. Foley (q.v.) and afterwards his assistant, completing, after Foley's death, many of his works, among others the O'Connell Monument in Dublin. The bust of Longfellow in Westminster Abbey was by him. He was elected an associate of the Royal Academy in 1883, and a Royal Academician in 1891.

BROCK'EN (*Mons Bructerus, Melibocus* of the ancient Romans), popularly known as the Blocksberg. The highest summit of the Harz Mountains. It is situated in Prussia, about 20 miles west-southwest of Halberstadt, and has an elevation of 3747 feet above the sea (Map: Prussia, D 3). The mountain is very frequently veiled in mist, and is celebrated for the phenomenon known as the *Brockengespenst* ('spectre of the Brocken'), which is nothing more than the shadows of men, houses, and other objects thrown upon the misty eastern horizon by the light of sunset. The mountain is very much frequented on account of fine views obtained from its summit, which has a hotel and observatory, and is reached by a railway line constructed in 1898.

BROCKES, brōk'ĕs, BARTHOLD HEINRICH (1680-1747). A German poet, born in Hamburg. He studied at the University of Halle, and afterwards at that of Leyden. He assisted in founding (1716) the 'Patriotic Society,' and in 1724-26 published *Der Patriot* (4 vols.). In his works he turns, with a simple religious faith, from the stilted conventionalism of the poetry of his day to the appreciation of nature, then but slightly understood. Particularly deserving of citation is his collection *Irdisches Vergnügen in Gott* (9 vols., Hamburg, 1721-48); new abridged edition by Stiehler (Leipzig, 1887). Consult Brandl's *Life* (Innsbrück, 1878).



A BROCKET.

BROCKET (Fr. *brocart*, from OF. *broc*, Fr. *broche*, spit, tine; cf. OF. *broquet*, dim. of *broc*). A book name of certain South American deer,

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because their antlers are simple spikes like those of a yearling stag. (See ANTLER.) They inhabit Brazil, are of "small size, heavy form, and arched back." There are four species, forming the subgenus Coassus, and varying from 19 to 27 inches in height. One is the Brazilian deer, or guazu-viva (*Coassus nemorivagus*), and is brown, each hair being tipped with white. Another is the guazu-pita (*Coassus rufus*). A closely allied form is the diminutive venada or pudu (*Pudua humilis*) of the Chilean Andes, the smallest of all deer, with spike horns only 2½ inches long. See PUDU, etc.

BROCKETT, LINUS PIERPONT (1820-93). An American author. He was born in Canton, Conn., and in 1843 graduated at the Yale Medical School. After a few years of practice in his profession, he devoted himself exclusively to literary pursuits, was connected, as editor or contributor, with many magazines, and published, among other works, a *History of Education* (1859); *Philanthropic Results of the Civil War* (1864); *Men of Our Day* (1868); *The Year of Battles* (1871); *Epidemic and Contagious Diseases* (1873); and *The Great Metropolis* (1888).

BROCKHAUS, brŏk'hous, FRIEDRICH ARNOLD (1772-1823). A German publisher, the founder of the Leipzig firm (originally established in Amsterdam, in 1805) that bears his name. The encyclopædia with which he is chiefly associated (Brockhaus's *Konversations Lexikon*) he purchased incomplete in 1808, after it had been in progress for 12 years. He completed a first edition in 1811, and a second was begun in 1812. The business was removed to Leipzig in 1818 and book-publishing was undertaken on a large scale. Brockhaus's sons and grandsons, who succeeded him, have carried the *Konversations Lexikon* through fourteen editions, and have conducted with success similar enterprises, notably Ersch and Gruber's gigantic *Allgemeine Encyklopädie* (167 vols., 1818-1890).

BROCKHAUS, HERMANN (1806-77). A German Orientalist, the third son of Friedrich Arnold Brockhaus. He was born in Amsterdam, and was educated in Leipzig, Göttingen, and Bonn. In 1841 he was called as a lecturer to the University of Leipzig, and in 1848 became professor of ancient Indian language and literature there. His works include the first five books of the great collection of fairy tales of Somadeva, *Kathasaritsagara* (1839-66); an edition (1845) of the play *Prabodhachandrodaya* of Krishna Misra; and a critical edition of the *Lieder des Hafis* (3 vols., 1854-61). In 1841 he proposed the plan of printing Sanskrit works in the Latin alphabet, and he did much in other ways to increase interest in and knowledge of the Oriental languages. He prepared the first glossary of the Avestan language, which was appended to an edition of *Vendidad Sade* (1850). In 1856 he became editor of Ersch and Gruber's *Allgemeine Encyklopädie*, and prepared Vols. LXII. to XCIX. of that work.

BROCK'PORT. A village in Monroe County, N. Y. 18 miles west of Rochester, on the Erie Canal and on the New York Central and Hudson River Railroad (Map: New York, C 2). It is the seat of a State normal school. The village is the centre of an agricultural region, and has manufactures of shoes, flour, canned goods, pianos, etc. Population, in 1890, 3742;; in 1900, 3398.

BROCK'TON. A city in Plymouth County, Mass., 20 miles south of Boston, on the New York, New Haven and Hartford Railroad (Map: Massachusetts, E 3). Its manufactures are important, especially those of boots and shoes. There are also manufactures of shoe-pegs, lasts, mechanics' tools, rubber goods, furniture, paper boxes, pianos, etc. The city has a public library of about 40,000 volumes. First settled in 1700 and originally a part of Bridgewater, Brockton was incorporated as the town of North Bridgewater in 1821. Its present name was adopted in 1874, and a city charter secured in 1881. The government is administered by a mayor, elected annually, and a bicameral city council. The executive appoints the license commissioners, and, with the concurrence of the board of aldermen, the board of health, members of the police department, and trustees of the public library. Other officials, excepting the school committee, which is chosen by popular election, are selected by the council. The annual income of the city amounts to about $1,600,000; the chief items of expense include $40,000 for the police department, $50,000 for streets, $60,000 for the fire department, and $140,000 for schools. Population, in 1890, 27,294; in 1900, 40,063. Consult Kingman, *History of Brockton* (Syracuse, 1895).

BROCK'VILLE. The capital of Leeds County, Ontario, Canada, taking its name from Gen. Sir Isaac Brock (q.v.). It stands on the left bank of the Saint Lawrence, about 40 miles below Kingston and 160 above Montreal (Map: Ontario, H 3). Its downward communications, formerly interrupted by powerful and rugged rapids, are now facilitated by canals or overcome by steam. Brockville is on the Grand Trunk Railway, is a port of call for the Saint Lawrence steamers, and has manufactures of steam-engines, agricultural machinery, tools, chemicals, gloves, etc., and good fishing. It is the seat of a United States consulate. Population, in 1891, 8793; in 1901, 8940.

BROCK'WAY, HOWARD (1870—). An American musician and composer, born in Brooklyn, N. Y., November 22, 1870. After pianoforte studies with H. O. C. Kortheuer from 1887 to 1889, at the age of twenty he went to Berlin, where he continued his instrumental studies with Barth, and composition with O. B. Boise. At the age of twenty-four he had composed a symphony (op. 12), a ballade for orchestra, and a violin and piano sonata (op. 9); as well as a cavatina for violin and orchestra. These, together with other piano solos, were given at a concert of Brockway's own works in February, 1895, at the Berlin Sing-Akademie. A few months later he returned to New York, where he has since lived as a teacher and performer. His *Sylvan Suite* was given by the Boston Orchestra in April, 1901.

BROCKWAY, ZEBULON REED (1827—). An American penologist. He was born in Lyme, Conn., April 28, 1827. In 1850 he entered upon prison service at the Connecticut State Prison. Thence he went to Albany County, N. Y., as deputy superintendent of the penitentiary, and in 1854 became superintendent of the Monroe County (N. Y.) Penitentiary. In 1861 he took charge of the House of Correction, Detroit, Mich., which position he gave up in 1876 to assume the superintendency of the New York State Reformatory at Elmira. This position he resigned in

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1900. He is still living in Elmira. See ELMIRA REFORMATORY; PENOLOGY.

BRO'DERICK, DAVID COLBRETH (1819-59). An American politician. He was born in Washington, the son of a stone-cutter; but early removed with his father to New York City, where he attended the public schools and afterwards learned his father's trade. He then kept a grog-shop for some time, became prominent as a leader of the rougher element in Tammany, and was chosen foreman of a volunteer fire-engine company, which had a considerable political influence. He nevertheless devoted much of his time to private study, and by his moral habits and his personal integrity earned the respect of the better element in the city. In 1846 he failed to secure a coveted election to Congress, and three years later removed to California, where he soon became the recognized leader of one of the two factions into which the Democratic Party in the State was then divided. He was a member of the California Constitutional Convention in 1849, and served two terms in the State Senate, for part of the time as presiding officer. In 1856 he was elected to the United States Senate, and soon became conspicuous for his opposition to the admission of Kansas under the Lecompton Constitution. In 1859 he took an active part in a rancorous political campaign in California, and, challenged at its close by Judge Terry on account of certain strictures in one of his speeches, he fought a duel on September 13, in which he was fatally wounded. His death under such circumstances caused a deep sensation in the East as well as in the West, and was generally attributed to the animosity aroused among slaveholders and their political sympathizers by Broderick's unyielding opposition to the further spread of slavery, especially in Kansas.

BRODERIP, brōd'rĭp, WILLIAM JOHN (1789-1859). An English lawyer and naturalist. He graduated at Oxford, studied and practiced law, edited law reports, and was for thirty-four years a London police magistrate. His leisure, however, was devoted to science, and he was a member of most of the important societies. He contributed to their *Transactions*, to the periodicals, and wrote the zoölogical articles for the *Penny Cyclopædia*. His great conchological collection was purchased by the British Museum.

BROD'HEAD, JOHN ROMEYN (1814-73). An American historian, born in Philadelphia, Pa. He removed with his parents to New York City in 1826, graduated at Rutgers College in 1831, and in 1835 was admitted to the bar, but soon abandoned the practice of law and devoted his attention almost entirely to the study of the history of New York. For several years after 1839 he was connected with the United States legation in Holland, and while there was appointed (1841), in pursuance of an act of the New York Legislature, to procure and transcribe documents in European archives relating to the history of the State. He devoted himself to this task with great energy, and succeeded in collecting more than 5000 documents, many of which had been previously unknown to historians. "The ship in which he came back," says Bancroft, "was more richly freighted with new material for American history than any that ever crossed the Atlantic." The documents were printed by the State, under the editorship of O'Callaghan and Fernow, as *Documents Relating to the Colonial History of the State of New York* (14 vols., Albany, 1856-86). From 1846 to 1849 Brodhead was secretary of legation in London, George Bancroft then being the United States Minister to England, and from 1853 to 1857 he was naval officer of the port of New York. His reputation rests chiefly on his *History of the State of New York* (2 vols., 1853-71), which is notable for its thorough scholarship, its candor, and its painstaking accuracy, and which, though left incomplete, remains the standard work for the period covered—1609 to 1691. Brodhead also published *An Oration on the Conquest of New Netherland* (1864), and an address entitled *Government of Sir Edmund Andros Over New England* (1867).

BRO'DIE, Sir BENJAMIN COLLINS (1783-1862). An English surgeon. He studied under Sir Everard Home at Saint George's Hospital, to which he was elected assistant surgeon in 1808, and afterwards surgeon. He had previously lectured both on anatomy and surgery. In 1810 he was elected a fellow of the Royal Society, and in 1811 received its Copley Medal for physiological papers which he had contributed. In 1819 he was appointed professor of comparative anatomy in the Royal College of Surgeons, and later became president. He was also attending physician to George IV. William IV. made him sergeant-surgeon in 1832 and two years later a baronet. Brodie was also sergeant-surgeon to Queen Victoria and first surgeon in ordinary to the Prince Consort. In 1858 he was elected president of the Royal Society. He was a corresponding member of the Institute of France, and foreign member of other learned societies and academies in Europe and America. He published many medical works, which, together with his *Autobiography*, were issued in a collected edition in 1865.—His son, SIR BENJAMIN COLLINS BRODIE (1817-80), became eminent as a chemist, and published much on the subject of chemistry. In 1855 he was elected Aldrichian professor of chemistry at Oxford, his Alma Mater, and received the degree of D.C.L. from that institution.

BROD'RICK, Hon. GEORGE CHARLES (1831—). An English educator, born at Castle Rising, Norfolk. He was educated at Eton and at Balliol College, Oxford, elected a fellow of Merton College (1855), took the degree of LL.B. at the University of London (1858), and was called to the bar from Lincoln's Inn (1859). He was a member of the London School Board (1877-79), and elected warden of Merton College (1881), a position which he still holds. Brodrick has taken an active part in university extension, and has contributed largely to the periodicals. Among his works are *Political Studies* (1879); *English Land and English Landlords* (1881); *Memorials of Merton College* (1885); *Short History of Oxford University* (1886); and *Memories and Impressions* (1900).

BRODRICK, WILLIAM ST. JOHN FREEMANTLE (1856—). An English statesman. He graduated in 1879 at Balliol College, Oxford, sat as a Conservative for West Surrey from 1880 to 1885, and from 1886 to 1892 was financial secretary to the War Office. In 1895-98 he was Under-Secretary of State for War, with power to direct war-office affairs in the House of Commons, and in 1898 was appointed Under-Secretary of State for

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Foreign Affairs. He was made Secretary for War in 1900. In 1885 he was elected to represent the Guilford division of West Surrey. It was on his motion that Lord Rosebery's Government was overthrown in June, 1895. As a student of political questions, he won the commendation of Mr. Gladstone.

BROD'SKY, ADOLF (1851—). A Russian violinist. He was born at Taganrog in the Province of the Don Cossacks, studied under Hellmesberger in Vienna, and became a member of the Hellmesberger quartet and of the orchestra of the Royal Opera in Vienna. Subsequently he undertook a concert tour, pursued further study under Laub in Moscow, and in 1875 was appointed an instructor in the Moscow Conservatory. He became director of the symphony concerts in Kiev in 1879, in 1882 a professor in the Leipzig Conservatory, and in 1891 an instructor in Scharwenka's Conservatory, New York. In 1895 he was appointed director of the Royal College of Music in Manchester, England. He appeared in concert with great success in 1881-82 in London, Vienna, Paris, and Moscow.

BRO'DY (Slav. pl. of *brod*, ford, referring to the swamps around it). A town in the Austrian Crownland of Galicia, situated on a swampy plain, surounded by forests, about 56 miles east-northeast of Lemberg, not far from the Russian frontier (Map: Austria, J 1). The town is well built, with broad, well-paved streets. Although its commercial importance has been on the decline for several years, it still remains a leading exchange mart between Austria-Hungary and Russia. The chief articles of commerce are grain, wool, cattle, furs, feathers, and agricultural implements, and its trade is almost entirely in the hands of the Jews, who constitute two-thirds of the population of the city. Population, in 1890, about 17,534; in 1900, 17,360.

BRODZINSKI, brŏd-zĕn'skē, KAZIMIERZ (1791-1835). A Polish poet, born at Krolowka (Galicia). He was professor of Polish literature in the University of Warsaw from 1826, until it was closed in 1831. He contributed much to the furtherance of Polish literature, through both his professional instruction and his published works, which include the idyllic poem *Wieslaw* (1820), and translations of the *Book of Job* and the dramas of Schiller. The best edition of his works is that by Kraszewski (Warsaw, 8 vols., 1872-74).

BROFFERIO, brŏf-fä'rē-ō, ANGELO (1802-66). An Italian poet and publicist, born at Castelnuovo-Calcea. In 1834 he established the *Massaggiere Torinese*, and from 1849 to 1856 he edited the radical *Voce della Libertà* ("The Voice of Liberty"). From 1848 until his death he was a member of the Parliament of Piedmont, and achieved distinction as one of the foremost orators of the democratic opposition. Against Count Cavour he directed his satire, *Il Tartufo politico* (1859). His other works include: *Storia del Piemonte dal 1814 ai giorni nostri* ("History of Piedmont from 1814 to Our Own Day," Turin, 5 vols., 1849-52); *Scene elleniche* ("Greek Scenes," last ed., Turin, 1884); the extremely popular *Canzoni piemontesi* ("Songs of Piedmont," 8th ed., Turin, 1885); and *I miei tempi* ("Recollection of My Times," 20 vols., 1858-61).

BROGLIE, brō'y', ACHILLE CHARLES LÉONCE VICTOR, Duc de (1785-1870). A French statesman. He was born in Paris, November 28, 1785. The family was Piedmontese, but had won distinction in the armies of France, one of its members obtaining the rank of marshal under Louis XIV., and another holding the post of commander-in-chief under Louis XVI. The father of Achille died in 1794 on the guillotine, but left the injunction to his son to remain faithful to Liberty even though she was ungrateful and unjust. "His father murdered, his mother in prison, his property confiscated and plundered, the young de Broglie first appears in life in wooden shoes and a red cap of liberty, begging an assignat." Early in life he was a member of Napoleon's Council of State. Broglie entered the House of Peers in 1815, just before he was thirty years old. At the trial of Marshal Ney, he alone had the courage to speak and vote for acquittal on the ground that the Marshal was not guilty of premeditated treason. During the Restoration he acted with the doctrinaires, of whom Guizot was the ablest representative. In 1816 he married Mme. de Staël's daughter Albertine. About the same time he became the ally of Clarkson and Wilberforce in the anti-slavery cause. In Louis Philippe's first Cabinet he was Minister of Public Worship, and in 1832 succeeded Casimir Périer as Minister of Foreign Affairs. In 1835 he was the head of the Cabinet. Riding beside the King when Fieschi's attempt on the life of Louis Philippe was made, Broglie received one of the bullets through his coat collar. He retired permanently from public life in 1836. Though not in office, Broglie preserved through life close personal and political friendship with Guizot. The overthrow of the constitutional monarchy in 1848 was a severe blow to the Duke; but he consented to sit in the republican assemblies, and labored to counteract what he deemed to be the evils of universal suffrage and to avert the coup d'état which he saw was impending. When it came he was conspicuous as one of the bitterest enemies of the imperial régime, though he admitted that an empire was 'the government which the poorer classes of France desired and the rich deserved.' His last twenty years were devoted to philosophical and literary pursuits, as the result of which he published *Ecrits et discours* (Paris, 1863). With regard to the future he said, "I shall die a penitent Christian and an impenitent Liberal." He was a member of the Academy and other societies. He died in Paris January 25, 1870. Consult: Guizot, *Le Duc de Broglie* (Paris, 1872): Broglie, *Personal Reminiscences of the Late Duc de Broglie*, trans. and edited by Beaufort (London, 1888).

BROGLIE, JACQUES VICTOR ALBERT, Duc de (1821-1901). A French statesman and historian, son of the preceding. His publication, in 1846, of a brilliant study, *Système religieux de Leibnitz*, brought him the place of secretary of embassy at Madrid, and later at Rome. After the Revolution of 1848 he defended the temporal power of the Pope and moderate consitutional liberalism in the *Revue des Deux Mondes*. Then followed in 1853 his *Etudes morales et littéraires*, and in 1856 his *Histoire de l'Eglise et de l'Empire romain au IV. siècle* (6 vols.), which gave him his seat in the French Academy in 1862. In 1870 he succeeded his father as Duke, and the following year was elected to the National Assembly. In 1871 he was also appointed

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ambassador to Great Britain, but was recalled by Thiers the following year. When Marshal MacMahon assumed the Presidency in 1873, the Duc de Broglie became Premier, and held the office until May 16, 1874. In 1876 he was elected Senator and resumed the leadership of the reactionary parties; and in 1877 he was again Premier for a few months. He achieved greater distinction as a historian than as a statesman. Among his works, other than those mentioned above, are: *Souveraineté pontificale et la liberté* (1861); *Le secret du roi: correspondance secrète de Louis XV.* (1878); *Marie Thérèse impératrice* (1888); and *Mémoires de Talleyrand* (1891).

BROGLIO, brō'lyō, EMILIO (1814-92). An Italian statesman and author, born in Milan, and educated at the universities of Verona and Pavia. He took part in the Revolution in Lombardy in 1848, and was appointed secretary of the Provisional Government. In 1856 he published twenty-five letters to Count Cavour "On the Income Tax" (*Dell' imposta sulla rendita*, Turin, 2 vols). He was a member of Parliament from 1861 to 1876, and from 1867 to 1869 was Minister of Public Instruction. His works include *Studii costituzionali* ("Constitutional Studies." Milan, 1860); *Della forme parlamentari* ("On Parliamentary Forms," Milan, 1865); and *Il regno di Federico II. di Prussia* ("The Reign of Frederick II. of Prussia," Rome, 2 vols., 1879-80).

BROGUE, brōg (Scotch from Gael. *brōg*, shoe, hoof). A rudely formed species of shoe of many varieties, formerly used by the aboriginal Irish and the Scottish Highlanders. The name has been applied to a modern kind of shoe, with a hob-nailed sole. It is also used to signify the peculiar pronunciation of English that distinguishes natives of Ireland. See SHOES AND SHOE MANUFACTURE.

BROHAN, brō'ăn', EMILIE MADELEINE (1833-1900). A French actress, born October 21, 1833, in Paris. At the age of fifteen she entered the Conservatoire, from which she was graduated in 1850 with the first prize for comedy. At her début the same year on the stage of the Comédie Française, she created the part of Marguerite in *Les contes de la reine de Navarre*, by Scribe and Legouvé, and made a great success. She was elected a *sociétaire* in 1852. Except for a two years' absence in Russia (1856-58), as a sequel to her unhappy marriage to M. Mario Uchard in 1854, she continued at the Théâtre Français till 1886, when she retired. Besides her successes in the classic repertory, notably as Elmire in *Tartufe*, and Sylvia in *Le jeu de l'amour et du hasard*, she created leading parts in a number of new plays, among them *Par droit de conquête*, *Les doigts de fée*, and *Rêves d'amour*, *Les caprices de Marianne*, *Le lion amoureux*, by Ponsard, and *Le monde où l'on s'ennuie*.

BROHAN, JOSÉPHINE FÉLICITÉ AUGUSTINE (1824-93). A French actress. She was born December 2, 1824, the daughter of Suzanne Brohan, also a well-known French actress, who died in 1887. Augustine Brohan, after distinguishing herself at the *Conservatoire*, made, in 1841, a brilliant début at the Théâtre Français, as Dorine in *Tartufe* and Lisette in *Rivaux d'eux-mêmes*. In 1842 she was elected a member of the company. Among the many plays in which she made her reputation were: *Le mariage de Figaro*; *L'Avare*; *Le bourgeois gentilhomme*; *La vieillesse de Richelieu*; *Les aristocraties*; and *La famille Poisson*. She was the author of several of the short dramatic pieces, known as *Proverbes*, for private representation, and was famous for her witty sayings, such as her parody of Rohan's celebrated motto, "Coquette ne veux, soubrette ne daigne, Brohan suis." In 1866 she retired from the theatre, owing to an affection of the eyes, and soon afterwards became the wife of M. Edmond David de Gheest, who died in 1885.

BROILING (OF. *bruiller*, to boil, roast, probably from *bruir*, to roast; cf. Ger. *brühen*, to scald). A convenient and expeditious mode of cooking small pieces of meat, by laying them on a gridiron over a bright fire, or even on the coals themselves. The latter is perhaps the most primitive mode of preparing meat for eating, as may be supposed from the ease and simplicity with which it is managed. Broiling is, in fact, a quicker sort of roasting. The albumen of the outside being sealed up at once, the meat is rendered extremely nutritious, and therefore this process is much to be recommended.

BROKE, Sir PHILIP BOWES VERE (1776-1841). An English admiral. He went to sea at the age of 12, entered the British Navy, and in 1806 was put in command of the *Shannon*. In 1813 (June 1) he fought his famous battle with the American frigate *Chesapeake*, then commanded by Capt. James Lawrence. He was permanently disabled during the engagement, but was made a K.C.B. for his victory. Consult Brighton, *Memoir of Admiral Sir P. B. V. Broke* (London, 1866). See CHESAPEAKE, THE.

BRO'KEN BOW. A city and county-seat of Custer County, Neb., near the middle of the State, on the Burlington and Missouri River Railroad (Map: Nebraska, E 2). It is the centre of a productive farming and stock-raising district, and has some manufactures. Population, in 1890, 1647; in 1900, 1375.

BROKEN HEART, THE. A tragedy by John Ford, first acted in 1629 at Blackfriars by the King's servants, and published in 1633 in quarto, under the pseudonym 'Fide Honor,' with a dedication to William, Lord Craven. It was highly praised by Charles Lamb in his *Specimens of Dramatic Poets*, and was reprinted in 1811 in Weber's collection of the author's works (2 vols.). See CALANTHA.

BROKEN HILL. A mining town of Yancowinna County, New South Wales, Australia, the terminus of a railway line, 260 miles northeast of Adelaide and 17 miles east of Silverton (Map: New South Wales, A 3). The town is built on a ridge 150 feet above the plain, and has one of the richest silver lodes in the world. It has been worked since 1884. The annual output of silver, gold, copper, and tin in the district exceeds $8,750,000. Population (estimated), 20,000.

BROKEN WIND. See HEAVES.

BROKER (originally one who uses, manages, handles, OHG. *brūhhen*, AS. *brūcan*, ME. *bruken*, *broken*, Ger. *brauchen*, to use. For a similar development, cf. Ger. *Mäkler*, broker, from *mäkeln*, *makeln*, to act as broker, allied to Dutch *maken*, to make; also Ger. *handeln*, to deal, bargain, from *Hand*, hand—i.e. from 'handling').

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An agent employed to make bargains and contracts between other persons in matters of trade, commerce, and navigation for a compensation, commonly called brokerage. When a broker is employed to buy or sell goods, he is not intrusted with the custody or possession of them, and is not authorized to buy or sell in his own name. In this respect he differs from a factor; and he differs from an auctioneer in two particulars: (*a*) A broker may buy as well as sell, but an auctioneer can only sell; (*b*) a broker cannot sell personally at public auction, for that is the appropriate function of an auctioneer; but he may sell at private sales, while an auctioneer does not. A broker is strictly a middleman, or intermediate negotiator between the parties; and for some purposes he is treated as the agent of both parties, but primarily he is deemed merely the agent of the party by whom he is originally employed. As soon as the negotiation is concluded he makes a memorandum thereof, a copy of which he gives to each party. If the transaction is a sale, these copies are called *bought* and *sold notes*. Brokers are of various sorts, such as bill and note brokers, exchange brokers, insurance brokers, merchandise brokers, pawnbrokers, real-estate brokers, ship brokers, and the like. As a rule, the name of each class fairly indicates its peculiarities. Perhaps a few words should be added concerning two classes, in addition to the pawnbrokers, whose functions and liabilities will be considered in a separate article. See PAWNBROKER.

INSURANCE. The insurance broker is to be distinguished from the ordinary insurance agent, who represents and acts for the insurer; the broker is either the agent of the insured or a middleman between the insured and the insurer. His business is that of procuring insurance for those who choose to avail themselves of his services, and from any company which he or the insured may select. See INSURANCE.

SHIP. A ship broker is one whose business it is to sell or buy ships, or to charter vessels, or to procure contracts of freightage for them.

BROMBERG, brōm'bĕrk (for *Brahenberg*, the fort or hill on the Brahe). The capital of the administrative district of the same name, in the Prussian Province of Posen, situated on the Brahe, about 6 miles from its junction with the Vistula and 69 miles northeast of Posen (Map: Prussia, H 2). Its position on the Bromberg Canal, which connects the Oder and the Elbe with the Vistula, and on the Berlin-Danzig Railway, makes it an important centre of trade, mostly in lumber, flour, leather, coal, and wool. The principal articles of manufacture are vehicles, furniture, soap, candles, alcohol, and snuff. There are also breweries, distilleries, iron-foundries, locomotive-works, and dyeing establishments. It is governed by a municipal council of thirty-six members, who elect an executive board of fourteen. (See GERMANY, *Local Government*.) Bromberg was founded by the Teutonic Knights. It became part of Prussia in 1772, at the time of the first partition of Poland. Population, in 1890, 41,000; in 1900, 52,154.

BROME, RICHARD (? -c.1652). A minor English dramatist. In early life he was a servant to Ben Jonson, but soon attracted attention as a writer, and became one of a group comprising such men as Fletcher, Dekker, Ford, and Shirley. He was the author, in whole or in part, of twenty-four popular plays, the best of which are *The Northern Lass* and *The Jovial Crew*. Fifteen of these plays were comedies, original in plot, and introducing some very striking and realistic characters. His dramatic works were published, in three volumes, in 1873.

BROME GRASS (Neo-Lat. *bromus*, Gk. *βρόμος*, *bromos*, kind of oats, from *βιβρώσκειν*, *bibrōskein*, to eat), *Bromus*. A genus of annual or perennial grasses nearly allied to the fescue grasses. There are about forty species, mostly found in the north temperate zone, although some are found in South America. Some of the species are of considerable economic importance, while others are troublesome weeds. The brome grasses grow upon light soils, and are quite resistant to drouth. On this last account several species are highly valued in the semi-arid regions of the Great Plains, where they furnish considerable hay and forage. One of the best for this purpose is the smooth brome grass (*Bromus inermis*). This species is a native of Europe, grows to a height of 2 to 5 feet, and being perennial, soon completely occupies the land, to the exclusion of all other plants. A somewhat similar species is the annual Schrader's brome grass, or fescue grass (*Bromus unioloides*), of South America. In some of the Southern States it is considered one of the best winter grasses for pasturage. The soft brome grass (*Bromus mollis*) is a native of England and introduced into the United States. It has soft, downy leaves, which are readily eaten by cattle, but neither the quality or quantity of the herbage is very high. The seeds of this and other species have been reputed to be poisonous, but the evidence is not conclusive.

The giant brome grass (*Bromus giganteus*) produces a large amount of fodder in England, but cattle do not seem to relish it. *Bromus secalinus*, called rye brome chess, and cheat, is a troublesome weed in fields of wheat and rye. The seeds retain their vitality for a long time, and frequently appear in grain-fields where from some cause the cereal has been destroyed. To this fact the somewhat common belief that 'wheat turns to cheat' is to be attributed. That there is no foundation for such an idea is easily demonstrated. A number of species are very ornamental, and *Bromus brizæformis* is sometimes grown for winter bouquets.

BROME'LIA (after the Swedish botanist *Bromel*). A genus of monocotyledonous plants, the type of the family Bromeliaceæ, which embraces about 40 genera and 400 species, all of which are American. They are stemless, or with short stems, rigid, channeled, often spiny or scaly leaves. Prominent among the plants of this order are the bromelias, pineapple, Billbergia, and Tillandsia. Many species are epiphytic, growing attached to other plants, but not deriving subsistence from them. A common example is the Spanish or long moss (*Tillandsia usneoides*), of the Southern States, West Indies, etc. From this plant is obtained much of the so-called hair for stuffing mattresses, furniture, etc. The bromelias are West Indian and Brazilian in origin, but some have been introduced into other countries for the fibre they yield. *Bromelia pinguin*, called the wild pineapple,

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is a very common species. It is valuable as a hedge-plant, the rigid, spiny leaves resisting perfectly the attacks of animals. The leaves are very numerous, 5 to 6 feet long and 2 inches wide, tapering gradually to the tip. Another and perhaps more valuable species is *Bromelia sylvestris*. It has leaves 3 or 4 feet long and 1½ inches in width. The fibre of this is believed to be superior to that of *Bromelia pinguin*. The fibre of a number of other species has been more or less favorably reported upon, but so great is the confusion of the species that their botanical origin cannot be definitely stated. The cultivated pineapple (*Ananas sativa*) yields a good fibre, and the famous piña or pineapple cloth of the Philippine Islands is said to be produced from a wild form of the pineapple. This and other forms of these fibrous plants grow in great abundance throughout the tropics, and a thorough study would doubtless reveal their true value and relationships. The fruits of some of the wild species of Bromelia are used for various purposes. For the fruit of *Ananas*, see PINEAPPLE.

BROME'LIA'CEÆ (for derivation see BROMELIA). The pineapple family. An order of mostly stemless monocotyledonous plants, or with short stems, and rigid, channeled, and often spiny, fleshy leaves in rosettes. The flowers are borne in panicles or racemes on flower-stalks springing from the cluster of leaves. As a rule the three-parted flowers have highly colored bracts subtending them. There are about 40 genera and 400 species belonging to this order, most, if not all, of which are indigenous to tropical America. Some are terrestrial plants, living in dry situations, but most live attached to trees, not as parasites, but as epiphytes, and they form a very conspicuous feature of the flora of Brazil and elsewhere. The leaves of many are channeled above, and as they overlap below they hold considerable water in their funnels or pitchers. This habit and their abundant seed make them especially adapted to their epiphytic method of growing. In the water cups or funnels are found all sorts of débris, and in Venezuela a species of bladderwort (*Utricularia*) often grows in these situations. These plants often send out roots, but it is considered doubtful whether they have much use, aside from aiding in attaching the plant to its support. Some species show especial adaptations for the reduction of transpiration from their leaves. This is secured by the presence of a thickened cuticle, or by covering the leaves with peculiar scales, rendering the leaves scurfy. In the case of the common Spanish or New Orleans moss (*Tillandsia usneoides*), which hangs in such peculiar bunches from the trees of the Southern States, the stems are reduced to thread-like strands of a grayish color, covered with scales. To this order belongs the pineapple (q.v.), which is useful for its fruit as well as for the fibre which is secured from its leaves. This fibre is useful for many purposes, and the finer qualities make the piña cloth of the East Indies. This is often confused with 'grass cloth,' from which it can be distinguished by microscopical examination; the piña fibre is said to be without any twist. Pita fibre is obtained from Bromelia sylvestris, a member of this order, as well as from other plants. According to Wittmack's classification, the chief genera of this order are: Bromelia, Ananas, Billbergia, Æchmea, Pitcairnia, Puya, Dyckia, and Tillandsia.

BRO'MIC ACID (see BROMINE). $HBrO_3$. A colorless liquid with a bromine-like odor. It may be prepared by the action of bromine on silver bromate. The latter is made from potassium bromate, which is readily obtained by the action of bromine on caustic potash. Bromic acid combines readily with bases forming a series of salts called *bromates*, none of which are of any commercial importance. By heat they are all decomposed with evolution of oxygen. Like the chlorates, when mixed with sulphur or charcoal, they explode by percussion.

BRO'MIDES (see BROMINE). The salts of hydrobromic acid (HBr) may be produced by the action of this acid on metals, metallic oxides, or metallic carbonates; also by the action of bromine vapor on metals. At ordinary temperatures the bromides are solid, but when heated they generally fuse and volatilize with decomposition.

The most important bromide is that of potassium (KBr). This salt is made by adding bromine to a solution of potassium hydroxide, evaporating and heating the residue with some charcoal, the latter serving to reduce the bromate ($KBrO_3$) at first produced along with the bromide (KBr). The only salt thus obtained is potassium bromide, and this may then be purified by re-crystallization from water. Pure potassium bromide is a colorless, translucent, crystalline salt with a pungent, saline taste; it is extensively used in medicine, both as a sedative and a nervine. The medicinal dose of the bromide is 5 to 60 grains. Another important bromide is that of silver, which is made by adding silver nitrate to an aqueous solution of some other metallic bromide. Silver bromide is exceedingly sensitive to the action of sunlight, and is consequently much used in photography.

With the exception of silver bromide, which is insoluble, and of lead and mercury bromides, whose solubility is slight, the bromides of the metals are more or less readily soluble in water.

BRO'MIDRO'SIS (Gk. βρῶμος, *brōmos*, a bad smell + ἱδρώς, *hidrōs*, sweat). A condition of the sweat-glands causing a foul odor to the perspiration. For convenience' sake, the condition of offensive perspiration from any cause is called bromidrosis. Perspiration, in ordinarily cleanly people, is practically odorless. The consumption of garlic, onions, whale-oil, sulphur, phosphorus, alcohol, musk, and other substances gives a peculiar smell in each case to the perspiration. Constipated people have sweat with a fæcal odor, and some people excrete considerable urea by means of the skin. In smallpox there is a distinctive odor to the skin and the perspiration. Other people have perspiration with an odor like that of orris or bananas. All the odors of sweat, except those due to drugs or food ingested, are due to decomposition of the fatty acids in the secretion. The armpits and the feet are the offending parts of the body in most cases. Internal treatment to relieve excessive sweating is generally necessary; and salicylic acid, boric acid, sulphate of zinc, and other medicaments are used locally.

BRO'MINE (Neo-Lat. *brominium*, from Gk. βρῶμος, *brōmos*, stench; referring to its suffocat-

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ing odor). An elementary chemical substance discovered by Balard in 1826. It does not occur in the isolated state, but is found in combination with silver, as *bromyrite* and *iodobromite;* in combination with alkalies and alkaline earths, in sea and mineral waters, and in some saline springs; also in many marine plants and animals. Bromine is prepared commercially from liquors containing bromides, by distilling them with sulphuric or hydrochloric acid, and manganese dioxide. The crude bromine thus isolated may be purified by repeated fractional distillations, and, finally, by distilling with potassium bromide, for the purpose of removing any chlorine that may be present. Bromine is thus manufactured from the mother liquors of salt-works, especially at Stassfurt in Germany, and at Syracuse, N. Y., Pomeroy, Ohio, the Kanawha region in West Virginia, and Michigan, in the United States.

Bromine (symbol Br, atomic weight 79.96) is a dark, brown-red volatile liquid with a most irritating odor. Its specific gravity at 0° C. is 3.188828. It freezes at —7.3° C. to a reddish-brown crystalline solid with a semi-metallic lustre, and boils at 63° C. It is an irritant poison, and if dropped upon the skin produces a sore that heals with great difficulty. It is used as a bleaching agent and as a disinfectant; also in medicine, in the manufacture of certain coal-tar dyes (e.g. *eosin*), and in chemistry. During 1899, 433,004 pounds of bromine were produced in the United States, valued at $108,251. Among the inorganic compounds of bromine may be mentioned hydrobromic acid with the bromides, bromic acid with the bromates, and hypobromous acid with the hypobromites. Bromine also enters into the composition of a large number of organic compounds.

BROMLEY, brŭm'lĕ. A town in Kent, England, 10 miles southeast of London, on the Ravensbourne River. Besides modern institutions there is a college founded in 1666 by Bishop Warner, for widows of clergymen. There is also a fine Gothic church and a palace built in 1777 formerly owned by the Bishops of Rochester. Saint Blaise's well in the palace gardens was famous for its reputed miraculous powers before the Reformation. Population, in 1891, 21,684; in 1901, 27,358.

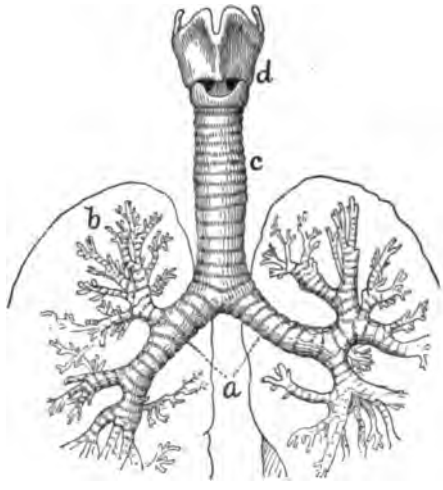
BRÖMSEBRO, brĕm'se-brô (the river *Brömsa* + Scand. *bro,* O. Icel. *brū,* bridge). A village of Sweden, about 30 miles south of Calmar, celebrated for treaties concluded there between Denmark and Sweden in 1541, 1641, and 1645.

BRO'MUS. See BROME GRASS.

BROMVOGEL, brŏm'fô-gel. The Dutch name in South Africa of the ground hornbill. See HORNBILL.

BRONCHITIS, brŏn-kī'tĭs (from Gk. *βρόγχος, bronchos,* trachea, windpipe, *βρόγχια, bronchia,* the bronchial tubes). A disease of the bronchial tubes. It includes: (1) an acute catarrhal process involving the larger bronchioles; (2) an acute catarrhal process involving the smaller and capillary tubes; (3) a chronic catarrhal process involving both larger and smaller tubes; (4) an acute fibrinous process; and (5) a chronic fibrinous process. It is caused by exposure to cold or wet; irritants such as dust, coal, etc.; congestion dependent upon kidney-disease, gout, or rheumatism, and even constipation, as well as heart-disease. The symptoms of bronchitis are pain in the chest, fever at the outset or continuing, cough generally with expectoration of mucus, at first scanty, later, perhaps, profuse and sometimes containing pus, shortness of breath on exertion, and occasionally, in the fibrinous varieties, the coughing out of casts of the tubes, resembling branches, of mucoid material. Various physical signs are found in the chest; but examination by a competent person alone will determine whether the attack be one of pleurisy, tuberculosis, pneumonia, or bronchitis. (See AUSCULTATION.) The acute form, when of the smaller tubes, may result in death. Many patients suffer with the disease every winter, and emphysema (q.v.) results in these cases. In young infants lobular pneumonia (q.v.) regularly accompanies capillary bronchitis, which is also a frequent occurrence in cases of epidemic influenza (*la grippe*). There are hereditary tendencies and individual predispositions which operate in some cases. On the approach of an attack the patient should take a hot bath, go to bed, take a purgative, and enter upon a milk diet till the physician arrives. Inhalation of hot-water vapor, through the small end of a funnel inverted over a vessel containing very hot water, relieves the irritation which causes coughing. Twenty drops of compound tincture of benzoin added to a pint of hot water will aid in making the inhalations soothing. Preparations of opium taken unadvisedly may do much harm. The daily cold sponge bath is an efficient preventive of bronchitis; it is best taken when the skin is warm and relaxed, immediately after rising from the bed in the morning. Ventilation and the avoidance of overheating rooms in winter, the avoidance of wetting the shoes—either soles or uppers—and abstinence from overloading heart and kidneys with alcoholic beverages, will do much to prevent acute bronchitis. See INFLUENZA. Consult Osler, *Principles and Practice of Medicine* (New York, 1901).

BRONCHUS, brŏŋ'kŭs (Neo-Lat. from Gk. *βρόγχος, bronchos,* windpipe). One of the sub-



a. The bronchi. b. Small bronchial tubes. c. The trachea. d. The larynx.

divisions of the trachea, or windpipe. Opposite the fourth dorsal vertebra, the trachea divides into two branches, or bronchi, which are similar

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in structure to the trachea itself. They are nearly round and cartilaginous in front, and flat, with muscular and fibrous tissue, behind, and are lined with mucous membrane. Of these bronchi, one goes to each lung, the right being little more than an inch; the left, about two inches in length. On entering the substance of a lung, the bronchi divide into smaller branches, which again subdivide, until they are no larger in diameter than one-fiftieth to one-thirtieth of an inch. These are the bronchioli. At the extremity of these smallest branches and opening into them are found clusters of small polyhedral cells, the air-cells, which consist of elastic tissue, with a lining of mucous membrane, and beneath the latter a layer of minute blood-vessels. For the histology of the bronchi, see LUNGS. See also RESPIRATION, ORGANS AND PROCESS OF.

BRONDEL', JOHN B. (1842—). An American Roman Catholic divine, born in Bruges, Belgium. He studied in the American College of the University of Louvain, and in 1864 was ordained priest in Mechlin. In 1866 he volunteered for missionary service in America, and was rector of Steilacoom, Wash., from 1867 to 1877, when he was transferred to Walla Walla. He returned to Steilacoom in 1878, became Bishop of Vancouver Island in 1879, and was appointed administrator apostolic of Montana in 1883, and in the following year became Bishop of Helena. His labors among the Indians have been highly successful, and his influence among them has frequently enabled him to be of great service to the national Government.

BRÖNDSTED, brēn'stĕd, PETER OLAF (1780-1842). A Danish archæologist. He studied at the University of Copenhagen. He then visited Italy and Greece, where he made excavations which furnished valuable materials for the study of classical antiquity, and after his return became professor in the University of Copenhagen. He wrote in six different languages. His principal work was *Voyages dans la Grèce accompagnés de recherches archéologiques* (1826). In addition to several smaller archæological papers, among which was *An Account of Some Greek Vases Found Near Vulci* (1832), and an account of the bronzes of Siris (1837), he also made valuable contributions to Danish history.

BRONGNIART, brō'nyär', ADOLPHE THÉOPHILE (1801-76). A French botanist, son of Alexandre Brongniart. He studied medicine, and in 1826 received a diploma, but he subsequently devoted himself particularly to the study of the physiology of plants. In 1833 he became professor of botany at the Jardin des Plantes, in Paris, and in 1834 a member of the Academy of Sciences, succeeding Desfontaines. His principal work and one that gave him an international reputation was his *Histoire des végétaux fossiles* (1828-47).

BRONGNIART, ALEXANDRE (1770-1847). A French naturalist. In 1790 he visited England for a scientific examination of the Derbyshire mines and pottery works, and, on his return to France, published a *Mémoire sur l'art de l'émailleur*. In 1797 he became professor of natural history in the Ecole Centrale. He was appointed in 1800 director of the porcelain manufactory of Sèvres, where he developed the art of painting on glass. In 1815 he was elected a member of the Academy of Sciences, and in 1822 he became professor of mineralogy in the Paris Museum of Natural History. His work on the *Classification des reptiles* (1807) was long the authority in herpetology, and his *Traité élémentaire de minéralogie* (1807) became a text-book for lecturers. In connection with Cuvier he published a famous work entitled *Essai sur la géographie minéralogique des environs de Paris* (1811). He also published in 1844 a *Traité des arts céramiques et des poteries*, and other works on the products of the Sèvres establishment.

BRONIKOWSKI, brō'nē-kōv'skē, ALEXANDER AUGUST FERDINAND von (1783-1834). A German novelist, born in Dresden. He entered the Prussian Army, but retired from service in 1807. At the outbreak of the war against Russia he joined the Polish contingent of the French Army and subsequently became a member of Marshal Victor's staff. He wrote a number of novels, drawn chiefly from the history of Poland, which became very popular. His manner somewhat resembled the method of Scott, but he lacked depth. His best work is *Hippolyt Boratynski* (4 vols., 1825-26). He also published a *Geschichte Polens* (1831).

BRONN, brōn, HEINRICH GEORG (1800-62). A German naturalist. He was born in Ziegelhausen, and studied in Heidelberg. In 1828 he became professor in the university, and after Leuckart's departure from Heidelberg, Bronn was appointed director of the zoölogical collection of the University. He wrote several important scientific treatises. His first was *System der urweltlichen Konchylien* (1824), which was followed by *System der urweltlichen Pflanzentiere* (1825). His most important geological work was *Lethæa Geognostica* (1836-38), on rock formations. *Allgemeine Zoölogie* (1850) was the first attempt to develop zoölogy in its entirety with reference to extinct organisms. He published, in 1860, a translation of Darwin's *Origin of Species*.

BRONSART, brōn'särt', HANS VON (full name Hans Bronsart von Schellendorff) (1830—). A German pianist and composer. He was born in Berlin, studied there under Kullak and Dehn, and in Weimar under Liszt; made several tours in Germany, France, and Russia, and directed the Euterpe concerts in Leipzig (1860-62). In 1865 he became von Bülow's successor as director of the concerts of the Gesellschaft der Musikfreunde in Berlin; from 1867 to 1887 was intendant of the Royal Theatre in Hanover; and from 1887 to 1895 of that in Weimar. The most important of his works are compositions for the pianoforte, the best known being a trio in G minor and a concerto in F sharp minor. To these should be added a cantata, *Christnacht*, for a double choir and orchestra, and *Frühlingsphantasie*, for orchestra, often performed in Germany.

BRONSART VON SCHELLENDORF, brōn'särt fōn shĕl'len-dōrf, PAUL (1832-91). A Prussian general, born in Danzig. He entered the army in 1849, became lieutenant-colonel in 1869, and was attached to the headquarters of the army during the Franco-Prussian War, serving as chief of division. Upon the capitulation of Sedan he was sent to the fortress to open the first negotiations with Napoleon III. In 1883 he became Minister of War. It was he

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who prepared the measure providing for an increase of the standing army (1887). During his term of office the repeating rifle was introduced into the infantry branch of the service, new pension laws were enacted, and the conditions of military service were modified. He wrote the following works: *Ein Rückblick auf die taktischen Rückbliche* (2d ed., 1870; English translation by H. A. Ouvry, London, 1871); *Der Dienst des Generalstabes* (3d edition by Meckel, 1893; translated into English under the title of *The Duties of the General Staff*, by W. A. H. Hare, 1877).

BRONTÆ'US (Gk. βροντάιος, *brontaios*, thundering, from βροντή, *brontē*, thunder). An epithet of Zeus.

BRONTE, brŏn'tâ. A city in the Province of Catania, Sicily, at the western base of Mount Etna, between the great lava streams of 1651 and 1843; 2600 feet above the sea, and 34 miles northwest of Catania (Map: Italy, J 10). The principal manufactures are paper and woolen goods; the adjacent valley of the Simeto produces large quantities of grain and wine. The town is celebrated chiefly for its connection with Admiral Nelson, who was created Duke of Bronte by the Neapolitan Government in 1799. Population (commune), in 1881, 16,577; in 1901, 20,366.

BRON'TË, ANNE. See BRONTË, CHARLOTTE.

BRONTË, CHARLOTTE (1816-55). An English novelist, born at Thornton, in the West Riding of Yorkshire, April 21, 1816. Her father, Patrick Brontë, a clergyman of Irish descent (the name is said to have been originally Prunty), removed, with five young children and an invalid wife, from Thornton to Haworth, in the same county, in 1820. Anne, the sixth and last child, was born the same year. Soon after the arrival Mrs. Brontë died; so that Charlotte, trying hard in after-life, could but dimly recall the remembrance of her mother. Her father, eccentric and solitary in his habits, was ill fitted to replace a mother's love; and though their mother's elder sister, Miss Branwell, and later the faithful servant 'Tabby,' entered the household, the children were left much to themselves. When Charlotte was eight years old she was sent with three of her sisters to Cowan's Bridge School, between Leeds and Kendal, which, whether deservedly or not, had an unfortunate notoriety conferred upon it 25 years later in the pages of *Jane Eyre*. The two elder sisters—Maria and Elizabeth—falling dangerously ill and dying a few days after their removal thence, Charlotte and Emily were taken out of the school. In 1831 Charlotte was sent to Miss Wooler's school at Roehead, between Leeds and Huddersfield, where her remarkable talents were duly appreciated by her kind instructress, and a friendship was formed with some of her fellow-pupils that lasted throughout life. A few years later she returned to Miss Wooler's school as teacher there, and she had, soon after this, some sorrowful experiences as governess in one of the two families where she found employment. It was with a view of better qualifying themselves for the task of teaching that Charlotte and Emily went to Brussels in 1842 and took up their abode in a *pensionnat*. When Charlotte returned home for good in 1844, a new shadow darkened the gloomy Yorkshire parsonage—her father's sight was declining fast, and her only brother was becoming an inebriate.

It now seemed plain that school-keeping could never be a resource, and the sisters—Charlotte, Emily, and Anne—turned their thoughts to literature. Their volume of poems was published in 1846, their names being veiled under those of Currer, Ellis, and Acton Bell; but it met with little or no attention. Charlotte's next venture was a prose tale, *The Professor*, and while it was passing slowly and heavily from publisher to publisher, *Jane Eyre* was making progress. *Jane Eyre* appeared in 1847, and took the public by storm. It was felt that a fresh hand, making new harmonies, was thrown over the old instrument. Henceforward Charlotte Brontë had a 'twofold life, as author and woman.' Over the latter the clouds closed thicker and thicker. Mr. Brontë had indeed recovered his sight; but Emily, the sister Charlotte so intensely loved, died in 1848. Her only brother, Branwell, also died in the same year; and Anne, the youngest of the family, following in 1849. Charlotte was left alone with her aged father, in a dreary home among the graves. Nevertheless, her energy never flagged. *Shirley*, begun soon after the appearance of *Jane Eyre*, was published in 1849; and *Villette*, written under the frequent pressure of bad health and low spirits, came out in 1853. In the spring of 1854 Charlotte Brontë was married to her father's curate, the Rev. A. Nicholls, who had long known and loved her. It is a relief to find that a little sunshine was permitted to the close of a hitherto clouded life. It was, however, but brief. She died March 31, 1855.

All the Brontës possessed ability akin to genius.—BRANWELL (1817-48), weakened by dissipation, left a few poems, among which are occasional lines showing the Brontë spirit.—ANNE (1820-49) died too young to achieve fame, but there is nothing commonplace about her two novels, *Agnes Grey* and *Wildfell Hall*.—The portrait of EMILY (1818-48) is drawn by her sister in *Shirley*. Having in mind, doubtless, her *Wuthering Heights* (1847) and her poems, Matthew Arnold declared that for passion, vehemence, and grief, Emily Brontë had had no equal since Byron. Charlotte was, perhaps, less vehement, but her novels come from an aching heart. And having seen more of the world, she possessed the greater insight into character. In execution the work of all the sisters is faulty; but Charlotte's is less so than that of the others. The standard *Life of Charlotte Brontë* (London, 1857), by Elizabeth Gaskell, has been supplemented by C. K. Shorter's *Charlotte Brontë and Her Circles* (London, 1896). Consult, also: *Life and Works of the Sisters Brontë*, with preface by Mrs. H. Ward and an introduction and notes to the life by Shorter (7 vols., London and New York, 1900); Reid, *Charlotte Brontë* (London, 1877); L. Stephen, "Essay," in *Hours in a Library*, 3d series (London, 1879); A. Birrell, *Life*, with bibliography (London, 1887); Robinson, *Emily Brontë* (Boston, 1883); Leyland, *The Brontë Family*, with special reference to Branwell (London, 1886); and the Brontë Society.

BRONTOPS. See TITANOTHERIUM.

BRONTORNIS. A genus of gigantic fossil birds from the lower Tertiary rocks of Patagonia, related to Phororhacos and other Ste-

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reornithes. (See BIRD, FOSSIL.) It was among the tallest of known birds. It "had leg-bones larger than those of an ox, the drumstick measuring 30 inches in length by 2½ inches in diameter, or 4½ inches across the ends; while the tarsus, or lower bone of the leg to which the toes are attached, was 16½ inches long and 5½ inches wide where the toes join on." Compare GASTORNIS.

BRON'TOSAU'RUS (Neo-Lat., from Gk. *βροντή, brontē*, thunder + *σαῦρος, sauros*, lizard). A gigantic herbivorous dinosaur of the suborder Sauropoda, the fossil remains of which are found in the upper Jurassic strata of Wyoming. The animal was of massive build, and attained the great length of 60 feet, with an estimated weight for the live beast of 20 tons. The trunk of the body was short and thick, the neck long and slender, the tail large and strongly built, and the head remarkably small. The fore limbs were as long as the hind limbs, indicating that the animal walked on all fours, and the feet were plantigrade—i.e. the beast walked on the flat foot, instead of on the toes; and the footprint covered a square yard of ground. The bones of the limbs were all solid and heavily built. In this respect they resemble those of the allied genus Diplodocus, while they differ from those of the majority of dinosaurs, whose bones are hollow. The long neck of the animal was probably of much use to him for feeding upon the more succulent upper portions of the aquatic plants among which he made his home, while his great bulk and small brain indicate that he was a slow-moving beast of low intelligence. For illustration, see DINOSAUR.

BRON'TOTHE'RIUM. See TITANOTHERIUM.

BRONZE (probably from Lat. *æs Brundisium*, Brundisian copper). An alloy of two or more metals, the chief ingredient always being copper, with tin next in proportion. Often zinc and lead have been used; but if zinc is in greater proportion than tin, the result is not properly a bronze (see ALLOY), while lead is never present in large amounts. Silver has been found in the analysis of ancient bronzes, but this may have come from an imperfect smelting of the tin. The bronze tools found in ancient quarries in Egypt are said to consist of 88 parts copper to 12 of tin, a hard alloy; but the supposed greater hardness which would have enabled stone-cutters to work with them may have been produced by hammering, although it has been suggested that phosphorus was used and has since disappeared. (See the paragraph treating phosphor-bronze, under ALLOY.) The famous mixture of antiquity called Corinthian bronze probably gained the brilliant color for which it was praised from a combination of copper and tin, in some such proportion as 90 of copper to 10 of tin, without other admixture.

Bronze is peculiar in this, that the alloy shrinks and occupies much less space than the aggregate of the separate metals. Probably because of this shrinking, involving some interpenetration of the atoms, it is harder than either copper or tin, and in this respect compares with zinc. Of course it is vastly harder than lead. It has the peculiarity of filling the mold perfectly, because when melted it is very fluid—much more so than copper by itself. Bronze is easy to work with the tool. If used in thin sheets it is one of the best metals for *repoussé* work, yielding regularly and evenly, and taking from the chasing-tool a beautiful and lasting finish. It takes from exposure to the weather, and especially to the earth in which it may be buried, a singularly beautiful green or greenish-blue color and a slightly powdery texture, which constitutes what the ancients called the *ærugo noblis*, and which is spoken of by the modern student as the ærugo or patina. It is possible to anticipate the action of such natural causes, and to give to the surface of the bronze an artificial color, as by the use of a 'pickle,' or by exposing it when red-hot to certain vapors. Thus, a jet-black patina is obtained by sulphur-fumes. The Japanese and Chinese produce ornamental bronzes, especially vases, platters, and the like, which are colored in clouded, mottled, and veined combinations, sometimes of vivid red with different shades of brown and of yellow. Sometimes these carefully prepared decorations of the surface produce an effect similar to that of crystallization.

MECHANICAL USES. As bronze gives very perfect castings, and is proof against the destructive property of the moisture of the air, it has been much used for the supports and mountings of astronomical instruments, as in China, and for cannon. This last use was common in Europe during the time of the Renaissance, and bronze cannon of the Sixteenth Century are remarkable for the beauty of their surface decoration, which includes sometimes the whole breech of the gun, and even the rings or staples which were used in early days to support the gun upon its carriage. All the varieties of alloy introduced since 1850 for mechanical purposes are used in the making of machinery and the like, and never or very rarely in the fine arts.

USE IN ART. Bronze has been in use for decorative purposes from prehistoric times. The museums are full of bronze utensils of decorative character, representing a known period of nearly 4000 years, besides much which cannot be dated of the work of outlying and little-known civilizations. The charm of ancient bronzes, Etruscan, Greek, and Mediæval, may be found very largely in the minute artistic and technical care which was given to each separate piece. The modern statuette, group, vase, or dish is commonly a mechanical reproduction of a model made by some artist whose supervision did not extend to the piece of bronze in question; but among the ancients each piece received the full attention of its maker, as in the case of a carving done directly by the hand, in wood or in ivory.

THE À CIRE PERDUE PROCESS. The art of making the bronze casting hollow, and so saving the material and insuring a quick and even cooling, is very ancient. It consists in putting a rough mass of the same material as the mold into the middle of it, so that the bronze fills only the space between them. The central core is first built up of some material capable of bearing heat, and this is brought to an approximate semblance of the form desired in the bronze. Upon this a coat of some very fusible material, such as wax, is placed, and is modeled by the sculptor into the perfect embodiment of his design. Upon this finished surface the material of the outer mold is applied in thin semi-liquid coats, each dried before the next is put on. The resulting block of clay will contain a thin mask or coat, say of wax, the outside surface of which is the required work of art. The melted metal is run into this thin division

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between the two masses of refractory substance; the wax instantly melts and disappears, and when the bronze has hardened and the mold is broken up, the surface of the cast will be a perfect reproduction of the sculptor's design. Practically all ancient artistic work in bronze was produced in this way. The process is called in modern times *à cire perdue*, 'with lost wax'; and it is evident that only one bronze casting can be obtained from each mold so made.

Ancient Bronzes. Working on these lines, the Etruscans especially, and at a later time the Greeks, produced bronzes in great numbers and of singular interest, the Etruscans putting into them the highly ornate and fantastical spirit of their decorative sense uncontrolled by the existence of a loftier expressional art. The more important works of the Greeks of classical times, excluding those connected with buildings, were in bronze, and their marbles were more commonly replicas or copies by inferior artists, used for the adornment of porticoes, gardens, or the like, while the original bronze filled its place in the temple for which it was made. The same tendency existed among the Romans. Bronze statues brought home by conquerors, or made by Grecian and other artists in the service of the masters of the world, filled not only Rome itself, but the other great cities of the Empire. The value of the metal, and the ease with which it could be broken up and cast or made into coins, has caused the disappearance of nearly all of these. A very few Greco-Roman bronzes have been brought to light by recent diggings and explorations; but these are nearly always utensils, tablets bearing inscriptions, and the like. Busts, and heads cut from lost statues, exist in considerable numbers. In the British Museum there are several of great interest, but these belong mainly to the period of the long-established Empire. In the little museum at Brescia, in Lombardy, is a bronze statue of heroic size, strongly resembling in its pose and general character the famous "Venus of Milo," and generally called the "Victory of Brescia." In the museum in Berlin there is a statue called the "Praying Boy," but the arms are restorations, although seemly and probable ones. The two or three large bronzes in the Etruscan Museum in Florence are of singular importance, especially the so-called "Orator"; they are not Etruscan in the sense of belonging to the years of the independent life of Etruria. The famous "She-Wolf" in the Palace of the Conservators in Rome is the most valuable piece of pure Etruscan bronze-work known to us; the two children are Sixteenth-Century additions. Besides these few pieces, the contents known as the Halls of the Greater and Smaller Bronzes in the Naples Museum contain the most valuable survivals of the Imperial period. In the third of the halls of larger bronzes there are forty-two statues and busts, all of human subjects and of life size or larger, most of them found in the Villa of the Papyri at Herculaneum. The halls of the smaller bronzes contain many statues and groups found in the same villa, and also the vast accumulation of decorative utensils found in Pompeii. Among them is the "Sleeping" (or "Drunken") "Faun," the "Hermes" seated on a rock, the six splendid draped female figures of pure Greek type known as the "Actresses" or the "Danseuses," the busts called "Apollo" and "Ptolemy," and the priceless head which has been called "Plato" from its sweet and cheerful gravity. In all these works the textile and tenacious character of the metal is allowed to dictate the character of the design. Only detailed description would make it clear how greatly these bronze pieces differ from works carved in hard material, such as marble or close-grained stone, or even wood or ivory. From the hair-dressing, in slight and thin corkscrew curls carried all around the head, and held in place by a broad band, as in the "Apollo" and the "Ptolemy," to the treatment of the thin folds of light drapery, and again to the mere pose of the figure in a position which no marble could be made to maintain, the metallic character of the design is always prominent.

Mediæval Bronzes. The use of bronze was not entirely abandoned during the Middle Ages. The toreutic or embossed statues of certain mediæval tombs, such as that of Edward III. in Westminster Abbey, are well known. In Italy such work was more common, largely because of the Byzantine influence; and church doors, as at Benevento, Milan, and Pisa, were made as easily in a pure and graceful Twelfth-Century style as the barbarous work of Verona and Ravello had been achieved two centuries earlier. The tendency of the Middle Ages was, however, to use metals mainly for the decoration of objects of religious and civil ceremony. In this way bronze served as a background for enameling, and for the framework of elaborate altar-pieces and the like. With the classical Renaissance in Italy, however, the use of bronze in the antique manner for statuary, bas-reliefs, busts, and the like was revived. Such pieces as the doors of the Baptistery in Florence, by Andrea Pisano and by Lorenzo Ghiberti, and those of the sacristy of the Cathedral near by, the work of Luca della Robbia; such statues as the "David" of Donatello, the "David" of Verrocchio, the "Perseus" of Cellini with its imaged pedestal, the "Mercury" of John of Bologna; such bas-reliefs as those of Donatello in the altar of San Antonio in Padua, and as those which adorn the pedestal of the statue of Duke Cosimo in the square in Florence; such pieces of decorative art as Pollajuolo's tomb of Pope Sixtus IV. and the candelabrum of the Florence Baptistery; such equestrian statues as that of Colleone in Venice, by Verrocchio, that of Gatamalata in Padua, by Donatello, and two by John of Bologna, the Dukes Cosimo and Ferdinand de'Medici, in Florence, are indeed the best known of this period; but they are only a few out of a great number.

Modern Works in Bronze. The work of the bronze-caster was less actively pursued during the Seventeenth and Eighteenth centuries, although there was no time when important works were not in progress; but with the Nineteenth Century, the growing wealth of the communities and their desire to put up, as out-of-door memorials, works which should be less perishable than the decaying marbles led to a remarkable revival of the art in a very remarkable manner, and to the starting of many important bronze-foundries. In the middle of the Nineteenth Century most important works were cast in Munich, but excellent foundries now exist in many of the great cities. In America there are two or three—one especially in New York, which does anything the sculptor can demand, if bronze is capable of it.

In the use of bronze for more minute and delicate ornamental purposes, the example of the

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Japanese has been of infinite use. The same lesson might have been learned of the Chinese; but the sudden throwing upon the market, about 1865, of a vast number of the precious collections held for years by the Japanese nobles has given to the Western world a singularly full first-hand knowledge of Japanese art. Statuettes of admirable truthfulness and of great spirit and vigor are not hard to obtain, nor very expensive. Some of known antiquity may command a price reaching to several hundred dollars; and in like manner some of the greater vases, basins of fountains, and the like are costly for their mere size and the value of the material, added to the difficulty of transportation; but there is much to be had even by persons of moderate means. The tendency in very recent times, and since Japan has become a manufacturer of commercial objects, has been toward much less beauty of form, but toward a singular taste and variety in the colors of the patinas artificially applied.

Consult: Fortnum, *Descriptive Catalogue of the Bronzes of European Origin in the South Kensington Museum* (London, 1876); Rein, *The Industries of Japan* (New York, 1889); Labarte, *Histoire des arts industriels*, Vol. I. (Paris, 1866), and *Description des objets d'art qui composent la collection Debruge-Dumenil* (Paris, 1867); Molinier, *Les bronzes de la Renaissance; les plaquettes* (Paris, 1886); *La Collection Spitzer* (6 vols., folio, Paris, 1890-92, Vol. IV.); Teirich, *Bronzen aus der Zeit der italienischen Renaissance* (Vienna, 1887); Wibel, *Beiträge zur Kenntniss antiker Broncen* (Hamburg, 1863); *Ostasiatische Broncegfässe*, etc., etc. (folio, Vienna, 1883); Rosignol, *Les métaux dans l'antiquité* (Paris, 1863); Delom, *Le cuivre et le bronze* (Paris, 1877); Servant, *Les bronzes d'art* (Paris, 1880).

BRONZE, Age of. A term used by modern writers to denote that period in the history of mankind when iron was unknown, and bronze (an alloy of copper and tin) was in general use for weapons, tools, and ornaments. That such a period existed in a large part of Europe between the later Stone Age and the introduction of iron is now admitted by most archæologists, though there is much difference of opinion in many points of detail. It should be noted that the term denotes a stage of civilization, not a chronological division, for there is no sharp line between the Stone and the Bronze ages; indeed, stone implements are common through much of the later period, and are not unknown after the introduction of iron. Nor, on the other hand, does bronze cease to be used for some time after the superiority of iron has been established. Moreover, while the beginnings of the Bronze Age in Europe are nearly synchronous, and seem to fall in the period between B.C. 2000 and 1800, as is rendered probable by the similarity of the earlier types throughout the Continent, the end of the period occurs in different places at widely different times. In Greece the pre-Mycenæan period is essentially a Stone Age, though the use of copper and bronze begins in Cyprus during this time. The Mycenæan period is marked by the use of bronze, though iron seems to have been known before this civilization passed away. Even in the Homeric poems iron is not common, and is highly valued, while bronze is in common use. In Italy the Terramare of the Po Valley belongs to the earlier Bronze Age, but the Villanova graves near Bologna, of about B.C. 1000, show the presence of iron, and it seems likely that the Bronze Age in Italy was of relatively short duration. In general it may be said that the duration and development of this period of civilization depended largely upon the accessibility of the regions where it flourished to traders from the south. Thus in France, Spain, and Central Germany, with which the Greeks early came in contact through Massilia and the Rhone Valley, iron was early introduced, and soon succeeded bronze for weapons and sharp tools, while in the valleys of Switzerland, among the lake dwellers, in Great Britain and Northern Europe, the use of iron was much later. Indeed some archæologists would allow the Bronze Age of Scandinavia to continue to the Second Century B.C., though Montelius places the commencement of the first iron period about B.C. 500-400. The chronology of this Swedish archæologist, a recognized authority in this field, is shown in the following table, abridged from one given in the *Journal of the Anthropological Institute of Great Britain*, Vol. XXIX. (1899), p. 309, though many students of Italian archæology hold that the dates for Italy are too remote.

B. C.	Central Italy	Central Europe	Great Britain and Ireland	Scandinavia and North Germany
2500–1900	Copper (and Stone)	Copper (and Stone)	Copper (and Stone)	Copper (and Stone)
1800	Bronze Age	Bronze Age	Bronze Age	Bronze Age
1000	Iron Age	" "	" "	" "
800	" "	Iron Age (Hallstatt)	Iron Age (Late Celtic)	" "
600	" "	" "	" " " "	Transition to Iron Age
400	Historic Time	" "	" " " "	Iron Age

Of course the Bronze and Iron ages are subdivided into many periods, which have been omitted here. It should also be said that European archæologists are by no means agreed upon the existence of a Copper Age, many claiming that while pure copper was doubtless used here and there, the discoveries have not been sufficient to warrant the belief in a general use for a considerable period of time. The existence of a Copper Age in North America is conceded by all, and there is much probability that such an age existed on the island of Cyprus and in Egypt. Outside of Europe the existence of the three ages is not so clearly traced. Recent discoveries in Egypt show that stone and metal were used side by side for a long period, while some Egyptologists hold that iron was not in general use until about B.C. 800. Consult: Hörnes, *Urgeschichte des Menschen* (Vienna, 1892); Evans, *Ancient Bronze Implements of Great Britain* (London, 1881); Chantre, *Age du bronze en France* (Paris, 1875-76); Montelius, *Les temps préhistoriques en Suède* (translation from the Swedish by S. Reinach, Paris, 1895); Morgan,

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L'Age de la pierre et les métaux en l'Egypte (Paris, 1896).

BRONZEWING, BRONZE-WINGED PIGEON, and BRONZE PIGEON. Names given in Australia to pigeons, chiefly of the genus Phaps, on account of the lustrous bronze color with which their wings are variously marked. They are otherwise also birds of beautiful plumage.—The COMMON BRONZEWING, or bronze-winged ground dove (*Phaps chalcoptera*) is distributed over all Australia. It is often seen in flocks, feeds on the ground, and builds its nest chiefly on low branches of trees growing on meadow-lands or near water. It is a plump bird, often weighing fully a pound, and is acceptable at every table.—The BRUSH BRONZEWING, or little bronze pigeon (*Phaps elegans*), is not so plentiful nor so widely distributed, chiefly inhabiting Tasmania and the southern parts of Australia. It inhabits low, swampy grounds, never perches on trees, resembles a partridge in its habits, and makes a loud burring noise like a partridge when it takes wing on being alarmed.—The HARLEQUIN BRONZEWING (*Phaps histrionica*) is found in the northwest parts of New South Wales in great flocks, feeding on seeds.—Some of the species of Geophaps, another genus, are also sometimes called bronzewing.

BRONZING. The process of imparting a bronze-like or antique metallic appearance to the surface of metal, as copper and brass, ivory, plaster or clay, and wood. The bronze effect on metals is frequently produced by beating bronze to thin leaves, similar to those of gold, which are then made into a paste with a size and applied to the metal. Sometimes bronze powders, such as *mosaic gold* or *aurum musivum*, which consists of equal parts of sulphur and white tin oxide melted together until they assume the appearance of a yellow, flaky powder, are employed. The many bronze powders of various names, as, for instance, *Dutch gold*, are similar to the foregoing, and consist of various ingredients, and are applied with size to the metal. Articles to which these various mixtures have been applied should be coated with a clear varnish, or otherwise the object will soon lose its metallic appearance. There are also a great number of bronzing liquids in which a metallic object may be dipped. They have a wide range of color as well as of composition, and formulas that are applicable to brass, copper, and zinc are to be found in the various technical receipt books. Among the well-known bronzing-liquids for gun-barrels is a mixture of 1 part nitric acid, 1 part sweet spirits of nitre, 2 parts alcohol, 4 parts copper sulphate, 2 parts tincture of iron chloride, and 60 parts water. The green *Patina* effect of ancient bronze is frequently imitated by coating new articles with a liquid consisting of 1 part ammonium chloride, 3 parts cream of tartar, 3 parts common salt dissolved in 12 parts of boiling water, to which is added 8 parts of a solution of copper nitrate. An antique appearance is often produced on silver by exposing it to the fumes of ammonium sulphide, or immersing it in a similar solution. Ivory may be gilded by immersing it in a solution of ferrous sulphate and then in a solution of gold chloride; and to coat it with silver the ivory is dipped in a weak solution of silver nitrate, after which it is immersed in clear water and exposed to the rays of the sun. The ivory then acquires a black color, which, on being rubbed, is changed to brilliant silver. In the bronzing of plaster or clay the figure is usually coated with an isinglass size until it will absorb no more. It is then slightly coated with gold size, and after drying, the figure is painted with bronze powder, and when completely dry the surplus powder may be rubbed off. A bronze effect is produced on wood in a somewhat similar manner. The wood is first coated with a mixture of size and lampblack, and then a suitable bronze powder, as of Dutch metal or mosaic gold, is laid on with a brush, and when thoroughly dry rubbed with a soft woolen cloth.

BRONZINO, brŏn-zē'nō, AGNOLO, or ANGIOLO (1502-72). An Italian painter, born at Monticelli. He was a pupil of Jacopo da Pontormo, whom he assisted in many works, and painted in both fresco and oil. He painted many portraits, which are considered among the best of his time. In his historical pictures he is an evident imitator of Michelangelo, and incontestably mannered. Despite defects of coloring, his works are in the main skillful. They include a "Descent of Christ into Limbo" (1552, Uffizi Gallery, Florence); 'Young Sculptor" (Uffizi); "The Dead Christ" (Florence Academy); and a portrait of Duke Cosimo I.

BROOCH, brōch (variant of *broach;* ME. *broche*, OF. *broche*, a spit, It. *brocea*, split stick, from Med. Lat. *broca*, *brocus*, a spit; cf. Gael. *brog*, awl). An ornamental pin or instrument for fastening the dress, consisting for the most part either of a ring or disk or of a semicircle, there being a pin in either case passing across it, fastened at one end with a joint, and at the other with a hook. Brooches were much used in antiquity, and varied in form as much as in modern times. They were worn both by men and women, and with a view both to ornament and use, from the time of Homer to the fall of the Western Empire. The oldest bit of Latin now known to be in existence is inscribed upon a brooch. See FIBULA PRÆNESTINA.

BROOCH OF VUL'CAN, THE. A title sometimes given to Chaucer's *Complaint of Mars*, dealing with a brooch which Vulcan made at Thebes.

BROOD BODY and **BROOD BUD.** See VEGETATIVE PROPAGATION.

BROOK, MASTER. An alias adopted by the jealous Master Ford in Shakespeare's *Merry Wives of Windsor*. In the disguise of this fictitious character, he gains the confidence of Falstaff, who confesses that he has designs upon Ford's wife.

BROOKE, CELIA. A character in George Eliot's *Middlemarch*. She is the matter-of-fact sister of the heroine, Dorothea.

BROOKE, DOROTHEA. The leading character of George Eliot's *Middlemarch*, with philanthropic ideals. After an unsympathetic marriage with Casaubon, she remarries and abandons her former undefined strivings.

BROOKE, FRANCIS KEY (1852—). An American Protestant Episcopal divine, Bishop of Oklahoma and Indian Territory. He was born at Gambier, Ohio, and graduated at Kenyon College, Ohio, in 1874. He has held rectorships at Grace Church, College Hill, Ohio; Christ Church,

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Portsmouth, Ohio; Saint James, Piqua, Ohio; Grace Church, Sandusky, Ohio; Saint Peter's, Saint Louis, Mo. (1886-88); and Trinity, Atchison, Kan. (1888-93).

BROOKE, HENRY (c.1703-83). An Irish author. He studied at Trinity College, Dublin, and the Temple, London, met Swift and Pope, and in 1735 published a poem entitled *Universal Beauty*, in the manner of Pope, by whom it was probably revised. An adherent of Frederick, Prince of Wales, he wrote, it is to be supposed, at the instance of his political friends, the tragedy *Gustavus Vasa* (1739), in which he sought to satirize Sir Robert Walpole in the person of Trollis, vicegerent to King Christiern, and which, prohibited from presentation in London, was later successfully given in Dublin as *The Patriot*. His *Earl of Essex* (1749; performed in Dublin in 1749, later in London) contained the lines:

"For righteous monarchs,
Justly to judge, with their own eyes should see;
Who rule o'er freemen should themselves be free,"

parodied by Dr. Johnson with,

"Who drives fat oxen should himself be fat."

In 1745 he was appointed by Lord Chesterfield to the post of barrack-master. He is probably best known to later readers by his novel *The Fool of Quality* (5 vols., 1766-70), abridged (1780) by John Wesley, who thought highly of it, and republished by Charles Kingsley (2 vols., 1859). He also translated (1738) three books of Tasso's *Gerusalemme liberata*. This version, praised by John Hoole, who rendered (2 vols., 1763; 8th ed., 1819) the entire epic, together with original poems, may be found in Chalmers, *Works of the English Poets*, Vol. XVII. (London, 1810).

BROOKE, Sir JAMES (1803-68). A Rajah of Sarawak, born at Coombe Grove, near Bath, England. His father was an employee of the Indian Government. James entered the East India military service, was severely wounded in the Burmese War, and furloughed in 1826. He lost his commission through overstaying his furlough (on account of shipwreck), but coming into a large property by his father's death, he determined to devote himself to the task of putting down piracy in the eastern seas and to establishing civilization in the islands. He was one of the practical Nineteenth-Century knights-errant in spirit. He purchased a yacht, trained a crew of twenty men on a preliminary cruise of three years in the Mediterranean, and in October, 1838, sailed from London for Borneo. When he arrived, Muda Hassim, the uncle of the Sultan of Borneo, was engaged in a war with some rebel tribes of Sarawak. Brooke lent his assistance and in return received the title of Rajah of Sarawak. Brooke instituted free trade, and framed a new code of laws. The custom of head-hunting was made a crime punishable with death; and piracy was so vigorously attacked with the assistance of British vessels that over £20,000 was paid in bounties for the killing of freebooters. Returning to England in 1847, Brooke was cordially received, made a Knight Commander of the Bath and an Oxford D.C.L., and appointed governor of the island of Labuan, near Sarawak, and consul-general to Borneo. In 1857, owing to charges in Parliament reflecting upon his integrity, which were, however, declared not proven by the commission that examined them, Brooke was superseded in the governorship of Labuan. His house in Kuching, his Sarawak capital, was attacked at night by a large body of Chinese, who were irritated at his efforts to prevent opium-smuggling, and he escaped with his life by swimming across a creek. He promptly assembled some natives, attacked the Chinese, defeated them in several fights, and drove them into the jungle. Upward of 2000 Chinese were killed. Returning to England soon after this, Brooke lectured in several of the chief towns on the advantage of the possession of Sarawak. Brooke returned to Borneo in 1861, but visited England again twice before his death, June 11, 1868. He was succeeded as Rajah of Sarawak by his nephew, Sir Charles Johnson Brooke, born June 3, 1829. (See SARAWAK.) Consult: Jacob, *The Rajah of Sarawak* (London, 1876); Sir S. Saint John, *Rajah Brooke* (London, 1899); and *Life of Sir Charles Brooke, Rajah of Sarawak* (London, 1879). The private letters of Sir James Brooke (1838-53) were published in London, 1853.

BROOKE, JOHN MERCER (1826—). An American physicist; born at Tampa, Fla. He was educated at Kenyon College (Gambier, Ohio), graduated in 1847 at the United States Naval Academy, and in 1851-53 was stationed at the Naval Observatory, Washington, D. C. Subsequently he accompanied, as director of the astronomical department, the *Vincennes* expedition for the exploration and surveying of the North Pacific Ocean. In 1861 he resigned from the United States Navy, and was appointed chief of the bureau of ordnance and hydrography in the Government of the Confederate States. He invented the Brooke gun, and devised the plans followed in refitting the *Merrimac* (*Virginia*) for the contests at Hampton Roads. From 1866 to 1899 he was professor of physics at the Virginia Military Institute (Lexington). He has received the gold medal of science of the Academy of Berlin, and contributed articles on ordnance and other subjects to technical magazines.

BROOKE, JOHN RUTTER (1838—). An American soldier. He was born in Pottsville, Pa., and in 1861 entered the Union service as a captain of volunteers. He soon rose to the rank of colonel, and at the close of the war was commissioned brigadier-general of volunteers for services during the battles of the Wilderness. He resigned from the volunteer service in 1866, became lieutenant-colonel in the regular army in the same year, and in 1879 was commissioned colonel. He was commandant at Fort Shaw, Mont., from 1879 to 1888, when he was appointed brigadier-general, and from 1888 to 1890 commanded the Department of Dakota, with headquarters in Saint Paul, Minn. In 1898 he was appointed major-general. In the same year, during the Spanish-American War, he was sent to Porto Rico, where he served on the commission to arrange for its evacuation by the Spanish troops, and in October was appointed Military Governor and commanding general of the department. From December, 1898, until December, 1899, he served as Military Governor of Cuba, and commanding general of the Division of Cuba, and in April, 1900, was assigned to the command of the Department of the East, with headquarters at Governor's Island, New York City.

BROOKE, STOPFORD AUGUSTUS (1832—). An English clergyman and author; born at Lettre-

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kenny, Ireland, November 14, 1832. He was graduated at Trinity College, Dublin (1856); took orders in the Anglican Church, and after holding various curacies in London and its vicinity was made chaplain in ordinary to the Queen (1872). In 1880 he seceded from the Anglican Communion, affirming his disbelief in the accepted doctrine of miracles. Among his many works which display literary sense may be mentioned: *Life of Frederick W. Robertson* (1865); *Theology in the English Poets* (1874); *A Primer of English Literature* (1876), which was revised and enlarged in 1896; *Sermons* (6 vols., 1868-88); *Poems* (1888); *Study of Tennyson* (1889); and *English Literature to the Norman Conquest* (1898). In conjunction with T. W. Rolleston, he edited *A Treasury of Irish Poetry in the English Tongue* (1901).

BROOK FARM. A socialistic community, founded in 1841, by the Brook Farm Association of Education and Agriculture at West Roxbury, Mass., which in its later history partially adopted the views of Fourier. The organizer and guiding spirit of the association was George Ripley. He gathered around him a number of persons of exceptional intellectual powers, chief among them being Hawthorne, Alcott, George W. Curtis, W. B. Channing, Charles A. Dana, and Margaret Fuller. The aim of this association, as explained by Ripley, was "more effectually to promote the great purposes of human culture, to establish the external relations of life on a basis of wisdom and purity," and, especially, "to substitute a system of brotherly coöperation for one of selfish competition." All members, without distinction of sex, had to labor an allotted period each day for the common good, either on the farm or in the workshop attached to the main institution. In pursuance of the attempt toward a more just recompense for labor, all employments were paid substantially alike. All shared the same food at the same table, all owned a like portion of the property belonging to the establishment, all had equal access to its educational and literary advantages. The society trafficked with the outside world, selling its surplus produce, and educating children at a low rate of compensation. But it was soon found that enough could not be earned for the needs of the establishment. Moreover, many of its brightest ornaments grew weary and left it. The remainder were disheartened. On March 3, 1846, a fire destroyed one of the most important and costly buildings. The association never recovered from this blow. It lingered on for a while and finally dissolved in October, 1847. Much of the celebrity attached to this organization is due to Hawthorne's *Blithedale Romance*, in which, under the guise of fiction, he has evidently utilized many of his experiences at Brook Farm. Consult: Codman, *Brook Farm Memories* (Boston, 1849); Russell, *Home Life of the Brook Farm Association* (Boston, 1900); Swift, *Brook Farm: Its Members, Scholars, and Visitors* (New York, 1900). See COMMUNISM; FOURIER.

BROOK'FIELD. A city in Linn County, Mo., about 100 miles east of Saint Joseph; on the Chicago, Burlington and Quincy Railroad. It contains a public library. The industries are represented by railroad shops, iron-works, lumber-mills, flouring-mills, brick-yards, grain-elevators, etc. (Map: Missouri, C 2). Coal is extensively mined in the vicinity, and forms, with grain, farm produce, and live stock, the bulk of a considerable export trade. Settled about 1860, Brookfield was incorporated in 1865. Population, in 1890, 4547; in 1900, 5484.

BROOK'HA'VEN. The county-seat of Lincoln County, Miss., 55 miles south by west of Jackson; on the Illinois Central Railroad (Map: Mississippi, E 7). It is the seat of the Whitworth Female College (Methodist Episcopal, South), opened in 1857. The city is the centre of an agricultural and lumbering region, has an important cotton trade (between 25,000 and 28,000 bales annually), and contains machine-shops, a cotton-compress, a cottonseed-oil mill, lumber-mills, etc. The water-works and electric-light plant are owned and operated by the city. Population, in 1890, 2142; in 1900, 2678.

BROOK'ITE (named for the English crystallographer H. J. Brooke). A yellowish to reddish-brown and black titanium dioxide that crystallizes in the orthorhombic system. Large crystals of it are found in the Tyrol, and a variety, called arkansite and consisting of thick black crystals, is found at Magnet Cove, Ark.

BROOKLIME (*Veronica beccabunga*). A species of speedwell. It is common in ditches, brooks, and wet places in Europe. In the United States, *Veronica americana*, which is sometimes called the American brooklime, occupies similar situations. It is a perennial plant, with mostly pedicled, ovate, or oblong leaves, and bluish flowers in auxiliary racemes.

BROOK'LINE'. A town in Norfolk County, Mass., including the villages of Cottage Farm, Longwood, and Reservoir Station, 3 miles west of Boston; on the Boston and Albany and the New England railroads (Map: Massachusetts, E 3). It is one of the most beautiful suburbs of Boston, with which it is connected by electric railroads; it is the seat of Riding Academy, and has a public library of about 45,000 volumes. There are manufactures of electrical supplies and screens of various kinds. The government is administered by town meetings. First settled as early as 1635, Brookline was known as the 'Hamlet of Muddy River' until, in 1705, it was incorporated as a town under the present name. Frequent attempts have been made to annex it to Boston, but have so far failed. In 1800 its population was only 605, and in 1840, 1265; but since it became a fashionable residence district its growth has been more rapid. Population, in 1890, 12,103; in 1900, 19,935. Consult: Woods, *Historical Sketches of Brookline* (Boston, 1874), and Bolton, *Brookline: The History of a Favored Town* (Brookline, 1897).

BROOKLYN, bruk'lin (originally, *Breuckelen;* see below). A borough of New York City, coextensive with Kings County, N. Y., until 1898 a separate city, and the county-seat of Kings County (Map: New York, G 5). It is situated on the western end of Long Island, separated from the Island and Borough of Manhattan by the East River, which connects New York Bay with Long Island Sound. The borough and county cover an area of about 66 square miles, extending north and south about 11 miles, and east and west about an equal distance. The water-front extends from Newtown Creek along the East River, upper and lower New York Bay, the Atlantic Ocean, and Jamaica Bay, to Old

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Mill Creek, the borough being surrounded by water on three sides. The northeastern boundary is an irregular line, which is crossed by a broad range of low hills extending into Queens County. The elevation of this district varies from the tidewater marshes to a height of about 195 feet at Mount Prospect. Along the shore opposite the lower point of Manhattan is an irregular bluff rising 70 to 100 feet, known as Brooklyn Heights. The southern portion of the borough is low.

THE RESIDENCE TOWN. Brooklyn has been called 'the Sleeping-Room of the Metropolis,' and again 'the City of Homes,' and 'the City of Churches.' Within its broad limits there are several tenement districts; along its western shore are busy commercial and manufacturing areas, and the southern shore has a peculiar character of its own; but the main part of the borough is made up of hundreds of miles of avenues and streets lined with dwelling-houses. The residence districts thus claim first attention as the distinctive feature of the place. The oldest part of Brooklyn is solidly built up of brick and frame houses set closely together; but even here the long and pretty rear gardens have been a noted feature of Brooklyn. The oldest fine Brooklyn houses on the Heights are of brick and brownstone, and hotels, large apartment-houses, and several club-houses also are found here. Along Clinton and Washington avenues there is a fine array of frame and brick villas, set in open grounds, with carriage-drives, trees, and flower-beds; and a similar district, more modern, is along New York, Brooklyn, and Saint Mark's avenues. Along Eighth and Ninth avenues, in the new region close to Prospect Park, and known as the Park Slope, is another attractive residence district. In the more distant parts toward the south, which a few years ago were still rural townships, there are large sections containing pretty detached residences of a much more modest character. The electric railroad is largely responsible for this new development, which may be expected to continue until the whole southern part of Brooklyn is covered with these suburban homes. Beyond the still unbuilt lands lie the beaches along the southern shore, which occupy an important place in New York summer life. See CONEY ISLAND.

THE BUSINESS DISTRICT. Near the lower end of Fulton Street the great level of low buildings, which are characteristic of Brooklyn, is broken by a cluster of tall structures, marking one of the most compact shopping districts in the world, a district containing both giant stores and small shops by the score. A short distance toward the East River are the huge steel and masonry structures used for banks, insurance companies, and mercantile offices, centring around Municipal Park, where are the municipal and county buildings, the Hall of Records, and the famous bronze statue of Henry Ward Beecher, by J. Q. A. Ward. On Montague Street, which runs from Municipal Park to the river, are a number of noteworthy buildings. The Academy of Music, with a seating capacity of 2300, is the largest place of amusement in the borough; the Art Association Building, which adjoins it, is a Gothic structure of brown sandstone ornamented with colored marble; opposite is the building of the Brooklyn Library. Among other buildings on the Heights may be mentioned the Hamilton Club, in front of which is a bronze statue of Alexander Hamilton, by W. O. Partridge; the handsome building of the Long Island Historical Society; the Church of the Holy Trinity; the Church of the Pilgrims, and the famous Plymouth Church. On Washington Street, west of Fulton Street, is the post-office, a granite building of large proportions in Romanesque style, with numerous turrets and a high tower, but disadvantageously situated on a narrow street. Adjacent is the tall office building of the *Brooklyn Daily Eagle*. In this vicinity, also worthy of note, are the buildings of the Packer and Polytechnic institutes; somewhat more remote are the Central Y. M. C. A. and Y. W. C. A., both of which occupy commodious and finely equipped quarters—a feature connected with the former being the well-known Association Hall, a popular concert and lecture auditorium. In various parts of the city are the buildings of Pratt Institute; the Germania and Union League clubs, the latter fronted by an equestrian statue of Gen. U. S. Grant, by W. O. Partridge; the Roman Catholic cathedral, and numerous other ecclesiastical edifices; the new Naval Branch Y. M. C. A. building; armories of the Thirteenth and Twenty-third regiments of the National Guard; and several of the charitable institutions. On Wallabout Bay is the Navy-Yard, which, built in 1824, is now the principal naval station of the United States. Of a total area of 144 acres in the grounds, the yard proper includes 45 acres, has a wharfage of over a mile, and contains foundries, machine-shops, etc., and two immense drydocks, 307 by 98 feet, and 465 by 210 feet, the latter admitting the largest vessels. East of the yard are officers' quarters, barracks, and parade grounds, and still farther east, across Wallabout Bay—on the opposite shore of which is Wallabout Market, an important centre of the produce trade of the borough—is a United States Naval Hospital.

INTERCOMMUNICATION. A short distance below the post-office are the entrance to Brooklyn Bridge (see BRIDGE) and the terminals of the elevated railroads. To this point, also, there come electric cars from every section of the borough, to join the endless chain across the bridge to Manhattan. The elevated roads and all but a few surface lines are now operated by a single corporation, which also operates the municipal railroad across the bridge; and Brooklyn passengers are now brought to Manhattan for a single 5-cent fare. The bridge has thus become more than formerly the principal route to the outer world. Yet the other means of transportation are more crowded than before the bridge was built. There are numerous ferry lines to Manhattan and one to Jersey City; of the former class, the most important are those from Atlantic and Hamilton avenues, and Montague and Fulton streets, to the lower end of Manhattan; and the lines to Roosevelt, Grand, Twenty-third, and Forty-second streets from Broadway, Brooklyn, which connect with elevated roads and surface lines from the northern parts of Brooklyn. A number of bridges are to be built across the East River, besides at least two tunnels under it. Work on a bridge from Broadway, Brooklyn, to Delancey Street, Manhattan, was begun in 1897. The Long Island Railroad, which does mainly a local passenger traffic to outlying towns, has its Brooklyn terminus at Flatbush

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Avenue, from which some trains are run over the elevated tracks and the Brooklyn Bridge to Manhattan; it will shortly, however, build a tunnel with a terminus in the heart of Manhattan.

PARKS, BOULEVARDS, AND CEMETERIES. Brooklyn has a large number of parks and parkways throughout its extended area. In the older closely built section the largest, Washington or Fort Greene Park, is in the Hill district, on the site of the Revolutionary earthworks known as Fort Greene. This park contains only about 30 acres, but has been called the most beautiful small park in the United States. The crest of the hill affords a magnificent view of the first city and one of the finest harbors in America, the navy-yard, and other points of interest. From this point the ground slopes in grassy terraces, beneath which are the remains of the American Revolutionary prisoners who died on the prison ship *Jersey*. South from the older sections, but near the present geographical centre of the borough, is Prospect Park, the largest of the Brooklyn parks, which takes rank with Fairmount, Central, and Druid Hill parks among early examples of municipal enterprise in this field. Prospect Park is not so large as those of some cities, but its 516 acres contain many natural beauties in its lake, fine old trees, wooded hills, and broad meadows; while its drives, ponds, playgrounds, gardens, and other embellishments have been laid out with taste and care. The lake, of 61 acres, is attractive for boating in summer and for skating in winter; and Lookout Hill, 185 feet above the sea, commands an extensive view of New York Harbor and Long Island. The principal entrance is at Flatbush Avenue, and the circular plaza in front is adorned by a large fountain and the imposing memorial arch in honor of the soldiers and sailors of the Civil War, surmounted by a large quadriga by Frederick Macmonnies. Within the park, near the entrance, is a statue, also by Macmonnies, of J. S. T. Stranahan, the creator of the Brooklyn park and boulevard system. At other points are statues of Lincoln, J. Howard Payne, Thomas Moore, and Washington Iriving. A tablet in Battle Pass commemorates the battle of Long Island, and a monument on the slope of Lookout Hill, the memory of the 400 Maryland troops who fell in that battle, a great part of which was fought within the park limits. From the Plaza east runs a boulevard 200 feet wide, called Eastern Parkway. Near the southern entrance begins the Ocean Parkway, a magnificent speedway with separate paths for bicycles and horses, leading to Coney Island, 5½ miles distant. Forest Park, in the northeastern part of the borough, contains 535 acres and is noted for its superb views and fine trees; there are also, in various other sections, smaller preserves, of which Tompkins, Winthrop, and Bedford parks are prominent examples.

West of Prospect Park, on a high ridge overlooking the bay, is Greenwood Cemetery, of 475 acres, the principal burying-ground in Brooklyn and the most beautiful in the country, rich in handsome monuments and mausoleums, many of them erected in honor of persons of world-wide fame. The Cemetery of the Evergreens and Cypress Hills Cemetery, also, are worthy of mention.

CHURCHES; CHARITIES; SCHOOLS AND LIBRARIES. The social life of this city of homes centres largely in the churches; and Brooklyn has long been distinguished for the number of these, and for the brilliant and able preachers secured to preside over the congregations. Among the widely known Brooklyn preachers of the past may be mentioned especially Henry Ward Beecher and Lyman Abbott, of Plymouth Church, T. DeWitt Talmage, Richard S. Storrs, Theodore L. Cuyler, and J. A. F. Behrends.

In addition to the private charities of the churches, many of the larger charitable institutions have ecclesiastical relations. There are also many institutions entirely undenominational; and altogether Brooklyn has some twenty-four dispensaries, eleven homes for the aged, twenty-five orphan asylums and industrial schools, six nurseries, several homes for incurables and consumptives, and an inebriates' home. Of some twenty hospitals, Long Island College, Saint Mary's, and Saint Peter's are of particular interest. There are also several training schools for nurses. At Flatbush are the public institutions, consisting of the almshouse, hospital, and insane asylum, the last now part of the State system. Kings County penitentiary, one of the six in the State, is also in this locality.

Brooklyn is celebrated for its educational facilities, both public and private. Among its private schools are the Packer Institute for girls and the Polytechnic Institute for boys, each with some 600 students, and Adelphi College (co-educational), with about 150 students in the collegiate department. Pratt Institute, with an endowment of $3,600,000 from its founder, furnishes manual and industrial training. Among other institutions are two Roman Catholic colleges, the Medical School of the Long Island College Hospital, and the Brooklyn College of Pharmacy. The public schools of Brooklyn hold high rank, the system including a Manual Training High School, a Commercial High School, a Girls' and a Boys' High School, a truant school, and a training school for teachers. A unique organization is the Brooklyn Institute of Arts and Sciences, developing from an association founded in 1823, chartered under its present name in 1843, and reorganized with a larger scope in 1887-88. Its aim is the education of the people in all branches of the arts and sciences by means of lectures, classes, and collections. It includes some twenty-five departments, each of which holds class meetings and public lectures, and its curriculum resembles that of a large university. One section of an immense museum building has already been built by the city on a conspicuous site near Prospect Park.

Brooklyn has numerous libraries, among which are: the Brooklyn, the Brooklyn Public, the library of the Brooklyn Institute, the Law Library of the Second Judicial District, the Long Island Historical Society Library, the Kings County Medical Society Library, the Pratt Institute Library, the library of the Union for Christian Work, and the Y. M. C. A. and Y. W. C. A. libraries.

THEATRES AND CLUBS. There are half a dozen theatres in Brooklyn, of which the Park is the oldest, and the Montauk and Columbia the finest; but these do not compare with the metropolitan houses in Manhattan. In music, however, Brooklyn has always had a high reputation; and there are a number of societies which secure the presence of the strongest musical talent in the country. The Boston Sym-

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phony Orchestra appears each year, and also the singers from the Metropolitan Opera. Literary and dramatic clubs find an appreciative constituency, the latter class being represented by such societies as the Amaranth, Booth, and Florence, which have more than a local reputation, and have served as training schools for not a few members of the professional stage.

Social clubs, however, do not play so important a part as across the East River; but there are several well-known institutions, such as the Brooklyn and Hamilton, representing the old residents on the Heights; the Lincoln, Oxford, and Union League on the Hill; the Montauk on the Park Slope; the Hanover in the Eastern District; the Algonquin of South Brooklyn; and the Crescent Athletic. Lesser clubs abound in all sections of the city.

TRADE AND INDUSTRY. Viewed from the east side of Manhattan Island, Brooklyn presents the appearance of a smoky seat of manufactures. The most notable establishments are the sugar-refineries; coffee and spice mills; chemical works; cordage and twine, and barrel factories; hat-works; boot and shoe factories; foundries, and boiler and iron works; and ship-building yards. Nearly 50 per cent. of the sugar refined in the United States is turned out in Brooklyn. These factories are located, mainly, along the East River shore, north of the Bridge, while south of the Bridge is the region of commerce. There are about 35 miles of water-front, along which nearly fifty lines of steamers (some of them transatlantic) dock, besides a large number of tramp steamers. The Atlantic Basin, opposite Governor's Island, has an area of 40 acres, with a wharfage of three miles, in which 500 large vessels can be accommodated at one time. The Erie Basin, to the South, has an area of 60 acres, and the Brooklyn Basin 40 acres. South of these are dry-docks, among the largest in the United States, one dock being 600 feet long and 124 feet wide. Its grain elevators and warehouses mark Brooklyn as one of the largest shipping points in the United States, its traffic, however, being included in that for the port of New York. Four-fifths of the grain received by the trunk railroads and the Erie Canal is stored in the Brooklyn elevators, which have a storage capacity of 20,000,000 bushels, and a correspondingly great transfer capacity.

GOVERNMENT. See NEW YORK, paragraph on *Government*.

POPULATION. 1790, 4495; 1800, 5740; 1810, 8303; 1820, 11,187; 1830, 20,535; 1840, 47,613; 1850, 138,882; 1860, 279,122; 1870, 419,921; 1880, 599,495; 1890, 838,547; 1900, 1,166,582, including 355,700 persons of foreign birth and 18,400 of negro descent.

HISTORY. Long Island was originally occupied by thirteen tribes of the Algonquin nation, the site of Brooklyn belonging to the Canarsie tribe. From them Jacques Bentyn and Willem Adriaense Bennett bought, in 1636, a tract of 930 acres at Gowanus, extending from Twenty-seventh Street to New Utrecht. In 1637 Joris Jansen de Rapelje, a Walloon, bought 335 acres on Wallabout Bay, called by the settlers the 'Waalbogt.' The Indian name for this region was Meryckawick Bay, and the Indian name for what is now Brooklyn Heights was Ihpetonga, the highlands. In 1636 Jan Evertsen Bout settled on the 'maize lands of Meryckawick,' and, with others, established Breuckelen, named for a town in Holland, about 18 miles from Amsterdam. In 1638 the West India Company bought the land east and southeast of Wallabout Bay, where the hamlet of Boswijck sprang up. In 1642 a ferry was established from a point near the present Fulton Ferry to Peck Slip, and a hamlet called 'the Ferry' sprang up about it. In 1646 Breuckelen was organized, and the 'Five Towns'—Breuckelen, Wallabout, the Ferry, Gowanus, and Bedford, inland—were united, and received a patent from Governor Nicolls in 1667. In 1651 Midwout, later Flatbush, was founded, and the first church was built there in 1665. In 1666 the first Dutch church was built in Breuckelen. After the Colony passed into the hands of the English, Long Island and Staten Island were called ridings of Yorkshire — Kings County, Staten Island, and Newtown constituting the West Riding—and this designation was used until 1683. In 1698 the population amounted to 509 persons, including 65 slaves, and at the beginning of the Revolution it was about 3500. On August 27, 1776, the battle of Long Island (q.v.) was fought on the site of Brooklyn, and the village was held by the British till November, 1783. During the Revolution the British prison-ships were moored in Wallabout Bay, and it is estimated that, during the period 1777-83, as many as 11,500 prisoners died of fever, starvation, and ill-treatment, the mortality on board the *New Jersey* being especially great, and the sanitary conditions especially revolting. In 1799 the first newspaper in Brooklyn was started, the *Courier and New York and Long Island Advertiser*. Brooklyn was incorporated as a village in 1816, and received its charter as a city April 8, 1834. In 1848 occurred a disastrous fire, which destroyed seven blocks of buildings on and near Fulton Street. Williamsburg (to the north of Brooklyn, adjoining the East River), which had become a city in 1851, and Bushwick (including Greenpoint) were consolidated with Brooklyn in 1855. A new charter was granted in 1873, and amended in 1880 and 1881. In 1886 the town of New Lots (including East New York) was annexed; in May, 1894, the towns of Flatbush and Gravesend were annexed; and New Utrecht, on July 1, 1894. Flatlands was taken in on January 1, 1896, when Brooklyn comprised all of Kings County, and was the largest city in extent in the State, with an area of 66.39 square miles. Under the act of the Legislature of 1897, creating the City of Greater New York, all of the City of Brooklyn as then existing was designated as the Borough of Brooklyn.

Consult: Stiles, *A History of the City of Brooklyn* (Brooklyn, 1869-70); Ostrander, *A History of the City of Brooklyn and Kings County* (Brooklyn, 1894); and Powell, *Historic Towns in the Middle States* (New York, 1899).

BROOKS, CHARLES WILLIAM SHIRLEY (1816-74). An English author. He was admitted to the bar, but adopted literature as a profession, and was a frequent contributor to leading periodicals and journals. He wrote several dramas, among them *The Creole* (1847); and the novels, *The Gordian Knot* (1860) and *The Silver Cord* (1861). But it is by his connection with *Punch*, first as contributor and then (after 1870) as editor, that Brooks is best remembered. His contributions were signed "Epicurus Rotundus." In

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1875 *Wit and Humour, Poems from Punch*, appeared.

BROOKS, Elbridge Gerry (1816-78). An American clergyman, born at Dover, N. H. He studied law, but in 1837 became pastor of the Universalist Church of West Amesbury, Mass. Subsequently, he held pastorates at East Cambridge, Mass. (1838); Lowell, Mass. (1845); Lynn, Mass. (1850); New York City (1859); and Philadelphia, Pa. (1868). In 1867-68 he was general secretary of the convention of the Universalist Church.

BROOKS, James (1810-73). An American journalist and politician, born in Portland, Me. He graduated at Waterville College in 1831, and was principal of a Latin school in Portland. He then became the Washington correspondent of the *Portland Advertiser*, and originated the idea of regular correspondence from the capital. He was a member of the Maine Legislature in 1835, and proposed a survey for a railroad from Portland to Quebec and Montreal. In 1836 he established the *New York Express*, published morning as well as evening. He was a member of the New York State Legislature in 1847, and in 1848 was elected to Congress. He favored the compromise measures of Henry Clay, and during the 'Native-American' excitement of 1851-54 was a leader of the Know-Nothing Party. After the outbreak of the Civil War he left the Whigs and was elected to Congress in 1865 by the Democrats. In 1872 he was censured by Congress—as he thought, undeservedly—for his connection with the Crédit Mobilier scandal. (See Crédit Mobilier.) He published, in separate form, *A Seven-Months' Run Up and Down and Around the World* (1872)—a series of letters which originally appeared in the *Express*.

BROOKS, John (1752-1825). An American patriot. He was born in Medford, Mass.; studied medicine, as an apprentice, under Dr. Simon Tufts; settled in Reading, Mass., to practice his profession; and there was chosen to command a company of minute-men, which, on April 19, 1775, helped to harass the British on their retreat from Concord to Boston. He was chosen major of a Massachusetts regiment in May, and served thereafter until the close of the war, participating in the siege of Boston, in the battles of Saratoga, and in the battle of Monmouth, attaining the rank of lieutenant-colonel in November, 1776, and strongly supporting Washington in the so-called Newburgh conspiracy of 1783. After the war he was frequently elected to the General Court, was a member of the convention which, in 1788, ratified for Massachusetts the Federal Constitution; was appointed district marshal and inspector of the revenue by Washington in 1795; served as adjutant-general of the State from 1812 to 1815; and from 1816 to 1823, when he refused to stand for reëlection, was Governor of Massachusetts. In 1792 he was appointed brigadier-general in the United States Army, but was honorably discharged four years later. He was for some time president of the Massachusetts Medical Society, and in 1816 received the degrees of M.D. and LL.D. from Harvard.

BROOKS, Maria Gowen (c.1795-1845). An American romantic poet, born in Medford, Mass., chiefly remembered as the author of *Zophiel, or the Bride of Seven* (1833). This was written in Cuba, her home after marriage. The first canto was published in Boston in 1825, and the complete poem in London in 1833, under the supervision of Southey, whom she had met on a visit to France and England in 1830-31. In *The Doctor*, Southey calls her 'the most impassioned and imaginative of all poetesses,' and elsewhere 'Maria of the West' (Maria del Occidente). In America the work found less favor. It was reëdited in 1879 with somewhat greater success. The poem is based on an incident in the Apocryphal book of Tobit, telling of the love of a fallen angel for the Hebrew maiden Sara. It contains good passages, but is uneven. On returning to America, Mrs. Brooks lived for a time at West Point, and afterwards on Governor's Island. In 1843 she published the somewhat autobiographical *Idomen, or the Vale of Yumuri*, and wrote an *Ode to the Departed*. She planned also an epic, *Beatriz, the Beloved of Columbus*. In December, 1843, she returned to Cuba and remained there until her death. She was undoubtedly a woman of much but unchastened poetic power.

BROOKS, Noah (1830—). An American journalist and author. He was born in Castine, Me., and was educated as an artist. In 1854 he went West, and settled in California as a newspaper man. From 1871 to 1875 he was a member of the staff of the *New York Tribune*. He became an editor of the *New York Times* in 1876, and in 1884 editor of the Newark (N. J.) *Daily Advertiser*. He retired from journalism in 1892. His many publications include: *The Boy Emigrants* (1876); *The Fairport Nine* (1880); *American Statesmen* (1893); *Short Studies in American Party Politics* (1896); and *The Story of Marco Polo* (1896).

BROOKS, Phillips (1835-93). A bishop of the Protestant Episcopal Church. He was born in Boston, Mass., December 13, 1835; graduated at Harvard in 1855, and at the P. E. Theological Seminary, Alexandria, Va., in 1859. He became rector of the Church of the Advent, Philadelphia, in 1859; of Holy Trinity there in 1862; removed to Boston as rector of Trinity in 1869; and was appointed Bishop of Massachusetts in 1891. He died in Boston, January 23, 1893. He published *Lectures on Preaching* (Yale lectures on the Lyman Beecher foundation, 1877); *The Influence of Jesus* (Bohlen lectures, Philadelphia Divinity School, 1879); and several volumes of sermons. He also wrote the favorite Christmas hymn, *O, Little Town of Bethlehem*. Consult his biography by A. V. G. Allen (New York, 1901). He was celebrated as a pulpit orator, and as a vigorous and independent thinker. His freedom from the ordinary sectarian trammels, his liberal views of doctrine, with his profound convictions as to vital Christian truths, and his deeply spiritual yet intensely practical preaching, gave him great popular power.

BROOKS, Preston Smith (1819-57). An American politician, notorious for his assault on Charles Sumner, in the United States Senate Chamber, in 1856. He was born in Edgefield District, S. C.; graduated at South Carolina College in 1839; was admitted to the bar in 1843; was elected to the State Legislature in 1844; and in 1846-47 served as a captain of volunteers in the war with Mexico. In 1852 he was elected to the House of Representatives, and was reëlected

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in 1854. Soon after the adjournment of the Senate on May 22, 1856, two days after Senator Sumner had delivered his speech on "The Crime Against Kansas," in which he had spoken with great severity of South Carolina and of Senator Butler, from that State (then absent from the Senate), Brooks, who was related to Senator Butler, assaulted Sumner while the latter was writing alone at his desk in the Senate Chamber, repeatedly striking him on the head with a cane, knocking him senseless, and inflicting spinal injuries from which Sumner never fully recovered. The House of Representatives immediately appointed a committee to investigate the affair, and the committee reported in favor of expelling Brooks, but the necessary two-thirds vote could not be secured for the motion. Brooks resigned voluntarily, however, after making a speech in justification of his act, but he was immediately reëlected by his constituents. Some remarks of Representative Anson Burlingame, on June 21, charging Brooks with cowardice and a lack of fair play, provoked a challenge from the latter, and a duel was arranged to take place in Canada, near Niagara Falls; but Brooks declined to fight at the place designated, for the reason that he could not reach it "without running the gauntlet of mobs and assassins, prisons and penitentiaries, bailiffs and constables." The assault caused the greatest excitement all over the country. The North was fiercely indignant, while the South, for the most part, upheld Brooks, and passed resolutions in his honor.

BROOKS, William Keith (1848—). An American zoölogist, born in Cleveland, Ohio, March 25, 1848. He took his baccalaureate degree at Williams College in 1870, and his degree of doctor of philosophy at Harvard in 1874. He was assistant in the Boston Society of Natural History in 1874-75, associate in Johns Hopkins University in 1876, and has been professor there since 1883. He has trained many of the prominent embryologists of the country. His work has been characterized by its relation to evolutionary problems. He has published *Hand-Book of Invertebrate Zoölogy* (1882); *Heredity* (1884); *The Development and Protection of the Oyster in Maryland* (1884); *Lucifer: A Study in Morphology* (1881); *The Stomatopoda of H.M.S. Challenger* (1886); *A Monograph of the Genus Salpa* (1893); *Foundations of Zoölogy* (1898).

BROOKS, William Robert (1844—). An American astronomer, born in Maidstone (Kent), England. He received an academic education, became an expert mechanical draughtsman, and in 1881, with a telescope of his own make, discovered his first comet. In 1874 he established, at Phelps, N. Y., the Red House Observatory, where he continued his astronomic studies, and in 1888 was called to Geneva, N. Y., there to take change of the Smith Observatory. He became known largely through his discovery of comets, twenty-three being the number with which he is accredited. A frequent lecturer on astronomical topics, he has also given much time to photography of the heavens. He was, in 1887, elected a fellow of the Royal Astronomical Society of Great Britain.

BROOKS, William Thomas Harbaugh (1821-70). An American soldier, born in New Lisbon, O. He graduated in 1841 at the United States Military Academy; served in the Third Infantry during the Florida War, and on garrison duty in 1843-44. During the Mexican War he fought at Palo Alto, Resaca de la Palma, and Monterey, and was brevetted major for meritorious services. Subsequently he was on frontier duty in New Mexico and Texas. Shortly after the outbreak of the Civil War he was appointed brigadier-general of volunteers, and was prominent in the Virginia Peninsular, Maryland, and Rappahannock campaigns. In 1863-64 he commanded the Department of the Monongahela, and in the latter year the Tenth Army Corps in the army operating against Richmond, Va. He resigned with the rank of major (Eighteenth Infantry).

BROOKS OF SHEF'FIELD. A fictitious character spoken of in Dickens's *David Copperfield*. David drinks confusion to him on a bachelor boating party, held during Mr. Murdstone's courtship of David's mother; but he later discovers 'Brooks' to have been a name given to himself.

BROOKS'S, brōōk'sez. A Whig club founded in London (1764) by the Dukes of Portland and Roxborough. Its place of meeting was originally a sporting-house, the first proprietor of which was Almack, and the second Brooks. Its present headquarters are 60 Saint James Street, and it continues to preserve its political nature.

BROOK'VILLE. A town and county-seat of Franklin County, Ind., about 65 miles east by south of Indianapolis; on the White Water River, and on the Cleveland, Cincinnati, Chicago, and Saint Louis Railroad (Map: Indiana E 3). It has good water-power, and is chiefly a manufacturing place with furniture-factories, brickyards, and saw, paper, and flour mills. Population, in 1890, 2028; in 1900, 2037.

BROOKVILLE. A borough and county-seat of Jefferson County, Pa., 105 miles northeast of Pittsburg, at the confluence of Red Bank Creek with other streams, and on the Allegheny Valley Railroad (Map: Pennsylvania, B 2). It manufactures extensively various products of lumber, and has also foundries, flour-mills, breweries, glass-works, furniture-factory, brick and tile works, etc. Population, in 1890, 2478; in 1900, 2472.

BROOM (AS. *brōm*, Dutch *brem*, OHG. *brāmo;* cf. bramble). A name given to a number of species of shrubs of the closely allied genera Cytisus, Genista, and Spartium, of the natural order Leguminosæ, suborder Papilionaceæ, all of them having long, slender branches, along which are produced axillary flowers. Common broom, *Cytisus scoparius*, the specific name being from the Latin *scopæ*, long twigs, or a besom, was once made the type of a genus under the name of *Sarothamnus scoparius* or *communis*. It is a well-known native of Europe, introduced into the United States, growing in dry soils, and in May and June ornamenting hedge-banks, hills, and bushy places with its large yellow flowers, which are on short stalks, drooping, solitary, but produced in considerable number along the straight, slender branchlets. The whole aspect of the plant is graceful. The lower leaves have three oblong leaflets; the upper ones, which are reduced to bracts, are simple. The branches are angular and of a very dark green; very tough and much in use for making besoms. The leaves being greatly reduced, their functions are per-

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formed by the young stems. They have also been used for tanning and dyeing, and their fibre has been woven into a coarse, strong cloth and even made into paper. The whole plant is very bitter, with a peculiar nauseous taste and smell when bruised. The young tops and seeds are used in medicine, being powerfully diuretic, and very beneficial in some kinds of dropsy. They are also mildly laxative, and, in large doses, emetic. They are commonly administered in the form of a decoction. Broom inhabits colder climates than furze, reaching to a greater elevation on mountains, and being found beyond the northern limit of furze. In 1899 plants were killed by the freeze in Washington, D. C., when the temperature fell to —15° F. It varies in size from a very humble shrub to one of 20 feet in height, and when it reaches this size the wood is of great value for the finer purposes of cabinet-makers and turners. Irish broom (*Cytisus* or *Sarothamnus patens*), not unfrequent as an ornamental plant in British shrubberies, is not at all a native of Ireland, but of Spain and Portugal. Some species of Cytisus are valued for the fodder yielded by the young, tender twigs. All of them are excellent bee-plants. Portugal broom or white broom (*Cytisus albus*), a native of the countries bordering on the Mediterranean, is very often planted as an ornamental shrub, and is much admired for the beauty of its fascicled white flowers, which are produced upon long filiform branches. Its leaves have three leaflets. It sometimes attains a height of 15 or 20 feet. *Cytisus proliferus albus* is an important fodder-plant for dry regions. It is a native of Madeira and generally goes under the name Tagosasti (q.v.). Spanish broom (*Spartium junceum*) is a native of the south of Europe, generally growing in dry soils and rocky situations, and attaining a height of 8 feet or upward. Its branches are upright, round, and rush-like, a characteristic of this genus. They are smooth and bear only a few small, simple leaves, which soon drop off. The fibre of the branchlets is much used in some parts of Italy, France, and Spain, for making cloth, ropes, etc. In Spain a fine lace that is much prized is made from the fibre of this plant. In the south of France the plant is cultivated on dry, unproductive soils. The branchlets are made into bundles, dried, beaten, steeped, and washed, in order to separate the fibre. The plant possesses medical properties similar to those of the common broom. A white-flowered species, *Spartium monospermum*, more properly called *Genista monosperma*, occasionally to be seen in shrubberies, grows abundantly on the loose sands of the coasts of Spain, and produces a similar fibre. It is mentioned by Barth as growing in great abundance in Africa to the south of the great desert. Many species somewhat resembling these are occasionally to be seen among ornamental plants, some of them often in greenhouses. The Canary Isles produce some remarkable for the fragrance of their flowers. The name broom is not given to those species of Cytisus (q.v.) and Genista (q.v.) which do not display in a marked degree the character of having long, slender twigs. Butcher's broom is a plant of an entirely different family.

BROOM-CORN. A plant of the order Gramineæ, generally regarded as a native of the East Indies. It is cultivated in the United States and southern Europe for the manufacture of brooms and whisk brushes, which are made from the open, long-rayed panicles. It is a variety of the same species (*Sorghum saccharatum*) to which doura, kafir corn, common sorghum, and other plants belong. The chief difference between this and other varieties of the species consists in the greater length, strength, and straightness of the fine stems composing the panicle. The plant has a jointed stem growing 8 to 12 feet high, and bears clusters of two and three spikelets on the ramifications of an open panicle. The cultivation of broom-corn in the United States is much older than the cultivation of common sorghum. Conditions of soil and climate suitable for maize are also adapted to this plant. The greater portion of the annual production is furnished by New York, Illinois, Kansas, and Nebraska, but it is grown in a number of other States. It is planted in hills about 18 inches apart in rows from 3 to 4 feet apart. A yield of 500 pounds of the brush or material for brooms is considered an average crop. When the panicle is nearly full-grown the stalks are broken over at a point 12 to 18 inches below the head. This position of the panicle tends to keep the brush straight. The heads are harvested before the seed is fully ripe, and while the brush is still green. They are cut off with 6 inches of the stalk, the seed is then removed by hand or machine, and the brush is cured in the shade to preserve its color and strength. The brush is pressed into bales weighing about 300 pounds. The United States exports broom-corn to different countries. The broom-corn produced in southern Europe is inferior in quality. As a forage crop broom-corn is not very important. For illustration, see BRAZILNUT, Plate.

BROOME, Sir FREDERICK NAPIER (1842-96). A British administrator and author. He was born in Canada, but was educated in England, and in 1857 went to New Zealand. He was appointed Colonial Secretary to Natal (1875) and to Mauritius (1877), Lieutenant-Governor of Mauritius (1880), Governor of Western Australia (1882), and Governor of Trinidad (1891). As Governor of Western Australia he promoted the construction of railroads and telegraphs, and in 1890 obtained for the Colony its coveted Constitution. In addition to his contributions to the *Times*, he published *Poems from New Zealand* (1868) and *The Stranger of Seriphos* (1869), a dramatic poem.

BROOME, WILLIAM (1689-1745). An English writer, coadjutor of Pope in translating the *Odyssey*. For writing the notes and translating eight books of the Greek text, he received £570, a price which he considered too small. Comments on this transaction annoyed Pope to such a degree that he abused Broome in the *Dunciad*. Broome published *Poems on Several Occasions*, and translated some of Anacreon's odes. Consult: Dr. Johnson, "Memoir of Broome," in *Lives of the Poets* (London, 1779-81); also Elwin and Courthope, *Pope's Correspondence* (London, 1871-89).

BROOM-RAPE (version of Med. Lat. *rapum genistæ*, broom knob or tuber, from *rapum*, knob or lump formed by the roots of trees, and *genistæ*, gen. sing, of *genista*, broom), *Orobanche ramosa*. An annual plant, 6 to 15 inches high, with many slender stems of a brownish or straw color, growing parasitically upon the roots of

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hemp and tobacco. The leaves of the plant are reduced to brown scales, and the light-blue flowers are scattered along the stalks. The broom-rape is a native of Europe, and has become established in some parts of the United States. The plant fastens upon the roots of the tobacco or hemp and sucks from them its nourishment, eventually killing the host it lives upon. Its seeds are minute and very abundant, and from the difficulty of its eradication, especial attention should be given to the use of absolutely clean hemp and tobacco seed in planting. For illustration, see Plate of PARASITIC PLANTS.

BROOMS. See BRUSH AND BROOM.

BROOM-SEDGE. See ANDROPOGON.

BROSBÖLL, brŏs'bĕl, JOHAN CARL CHRISTIAN (1816-1900). A Danish writer, whose pseudonym was Carit Etler. He was born in Fridericia, and studied painting at the Academy of Copenhagen, but took up literature as a means of livelihood. His works include novels, sketches of travel, and dramas, which, though imaginatively wrought, are marred y hasty composition. His *Skrifter* ("Collected Writings") appeared in Copenhagen in 1859-68 (24 vols.), to which was added a *Ny Samling* ("New Collection") in 1873-79 (5 vols.).

BROSIG, brō'zĭk, MORITZ (1815-87). A German organist and composer, born in Fuchswinkel, Silesia. He studied in Breslau under Franz Wolf, and in 1842 succeeded him as organist of the Breslau Cathedral. In 1852 he was appointed kapellmeister at the cathedral, and in 1871 lecturer on music at the University of Breslau. He published a text-book of harmony, and valuable Church music, including seven masses with orchestra, and many graduals and offertories.

BROSSE, brŏs, SALOMON DE, sometimes called JACQUES (1560-1626). A prominent architect of the late French Renaissance, a relative and follower of Andronet du Cerceau. His fame rests largely on the Luxembourg Palace, which he built for Maria de' Medici (1615-20).

BROSSES, brŏs, CHARLES DE (1709-77). A French historian. His first work was *Lettres sur l'état de la ville souterraine d'Herculée* (1750), the result of a tour through Italy in 1739. At the suggestion of his friend Buffon, the naturalist, he wrote the *Histoire des navigations aux terres australes* (1756), in which he described the supposed great southern continent under the several names of Magellania, Australia, and Polynesia. The last two of these names were first employed by him. His next work was *Du culte des dieux fétiches* (1760). It was followed by a *Traité de la formation mécanique des langues* (1765), which, in spite of many errors, contains many ingenious observations and conjectures. He contributed articles on language to the famous *Encyclopédie* of Diderot, Voltaire, and others. During the greater part of his life he was busily engaged in supplying the lacunæ in the works of Sallust; and having collected about 700 fragments by this historian, he published, with such interpolations as he deemed necessary, the *Histoire de la République romaine dans le cours du septième siècle, par Salluste* (1777). Many of his manuscripts were published after his death and a complete edition of his works in fifty-two volumes has been issued (1878-85).

BROTH (AS. *broth*, OHG. *brod*, *brot*, Gael. *brot*, Ir. *broth*, from the root of *brew*, AS. *breōwan*, OHG. *briuwan*, Ger. *brauen*). A liquid preparation of animal food, which differs from soup in that it contains no vegetables. The usual broths are made of beef, mutton, or chicken and are much used as food for invalids. The following are the recipes for the production of broths, taken from Curran's *Sickness and Accidents* (Chicago, 1894). *Beef Broth* (time, 1 hour).—One pound of lean, juicy beef, one pint of cold water, half teaspoonful of salt. Mince the meat, put it in a stewpan with the water and salt and boil slowly one hour, strain and add a little black pepper, if allowed, and serve hot with strips of dry toast. *Mutton Broth* (time, 2 hours).—Two pounds of lean, juicy mutton, one quart of cold water, one teaspoonful of salt. Remove all fat and skin, cut up the meat, put it in a stewpan with the water and salt and boil slowly an hour and a half. Strain, and set away to cool. When cold remove all fat and dregs, and heat a portion as required for use. *Chicken Broth* (time, 2 hours).—Three pounds of tender chicken, two quarts of cold water, two scant teaspoonfuls of salt. Skin the chicken (if it is very fat), cut it up, pound the pieces with a mallet until the bones are broken. Put it in a stewpan with the water and salt and boil slowly two hours; strain and set aside to cool; when cold remove all fat and dregs and heat as required for use.

There is very little nutrition in broths, as stated in the articles BEEF TEA and MEAT EXTRACT. The broth contains mainly gelatin, salts, fat, and extractives; these, however, are easily assimilated food upon which a convalescing patient may rely in part, as a change of diet for a feeble stomach.

BROTHEL, brŏth'el (for ME., OF. *bordel*, Med. Lat. *bordellum*, little hut, brothel, dim. of *borda*, hut, from Teut. *bord*, Engl. *board*, plank). Another name for bawdy house, a house of ill fame or house of prostitution; that is, a 'house kept for the resort and convenience of lewd people of both sexes.' The keeping of such a house was a misdemeanor at common law, as it still is, generally, under modern statutes. In the language of Lord Coke, such a house "is a common nuisance, and is the cause of many mischiefs, not only to the overthrow of the bodies of people and wasting of their livelihoods, but to the endangering of their souls." See PROSTITUTION.

BROTHERHOODS, RELIGIOUS. Societies instituted for pious and benevolent purposes, numerous in the Middle Ages and in the Roman Catholic Church of modern times. They are instituted especially for those who wish to have the help of organization and common aims, but are not conscious of a vocation to join the strictly religious orders. In some cases they appear as affiliated societies to the latter, as in the case of the Third Order of Saint Dominic and Saint Francis (see TERTIARY). In the Middle Ages a number of brotherhoods sprang up which either did not seek or did not obtain ecclesiastical recognition, and finally assumed the character of sects, with more or less of heretical tendency. To this class belonged, among others, the Beghards and Beguines (q.v.), the Apostolic Brethren (q.v.), and the Flagellants (q.v.), who, while

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tolerated by the Church for a while, at last incurred its censure and were severely repressed. We may also reckon among religious brotherhoods the old building corporations from which sprang the order of Freemasons (see MASONS, FREE), the character of whose secret societies indicated, in the opinion of the Church, a peculiarly dangerous tendency to Gnosticism: in modern times, of course, the well-known association of freemasonry on the Continent of Europe has given more ample ground for its condemnation by various Popes on the charge of atheism. Nearly all the professional and trade organizations of the Middle Ages had, in accordance with the spirit of the time, an essentially religious character; and this side of their activity was of equal importance with the secular side in the minds of their founders. (See GUILD.) A full idea of the extent to which this view of the matter prevailed in England even in the Sixteenth Century may be found in Gasquet, *The Eve of the Reformation* (London, 1900). Other confraternities which came into existence with the sanction of the Church devoted themselves to the promotion of religion, and, under its direct influence, to the performance of many practical works of charity, by assisting strangers, travelers, the unprotected, the oppressed, the destitute, and the sick. Typical examples of these mediæval brotherhoods are the Bridge-building Brotherhoods (q.v.), and, especially, the *Fratelli della Misericordia* at Florence, still existing, whose work it is to bury the dead, and under whose picturesque costume are frequently concealed the features of members of the noblest Italian houses.

The last two centuries have witnessed the growth of a great number of Roman Catholic confraternities, both for men and women, based on the same principle as these earlier ones. Many of them are more or less associated with the religious orders; thus the League of the Sacred Heart or Apostleship of Prayer, with millions of members all over the world, is under the direction of the Jesuits; the Rosary sodalities of the Dominicans; and the confraternities of the Scapular of the Carmelites.

BROTHERHOOD OF AN'DREW AND PHIL'IP. A brotherhood formed in 1888 by Rev. Rufus W. Miller, associate pastor of the Second Reformed Church, Reading, Pa. In 1895 it had grown into an order for religious and social service in the following denominations: Reformed (Dutch and German), Presbyterian (North and South, United and Canadian), Congregational, Methodist (Episcopal and Protestant), Baptist, English, Lutheran, and United Brethren. It has now a membership of about 14,000 in 32 States and 19 denominations. Its organ is *The Brotherhood Star*. It holds biennial federal and annual denominational conventions. For particulars, consult L. W. Bacon and C. A. Northrop, *Young People's Societies* (New York, 1900).

BROTHERHOOD OF ST. ANDREW. A Protestant Episcopal organization, whose object is the spread of Christ's kingdom among men, especially young men. It was founded in 1883 in Saint James's Parish, Chicago, by James L. Houghteling and others. The unit of organization is the local chapter; of these, 1706 have been organized. There is also a junior department for work among boys, which has 484 chapters. It is estimated that there are about 10,000 members in the Brotherhood proper, and 5000 in in the Junior Department. The headquarters of the Brotherhood are in Pittsburg. It holds an annual convention, and publishes monthly an official organ called *St. Andrew's Cross*. It has spread from the United States to Canada, to England, and to most of her colonial possessions. For particulars, consult L. W. Bacon and C. A. Northrop, *Young People's Societies* (New York, 1900).

BROTHERHOOD OF SAINT PAUL. A Methodist Episcopal fraternity of men of all ages, for religious and social service. It has a ritual and regalia, but is not secret. Its membership is divided into three 'orders.' (1) Order of Jerusalem: for all new members and those not professing Christianity; (2) Order of Damascus: for Methodist Episcopal Church members; (3) Order of Rome: for advanced Christians. It was organized in 1895 by Rev. F. D. Leete, Rochester, N. Y., and holds annual conventions. For particulars, see L. W. Bacon and C. A. Northrop, *Young People's Societies* (New York, 1900).

BROTHER JON'ATHAN. The name of the best-known personification of the United States, the origin of which is doubtful. The most plausible explanation derives it from Jonathan Trumbull (q.v.), Governor of Connecticut during the Revolution, and a highly esteemed friend of General Washington, who, it is said, was accustomed to remark when perplexed by some knotty question, "We must consult Brother Jonathan." From its frequent repetition, the term became widely known, and ultimately expanded in meaning to embrace the whole American people.

BROTHERS, THE. A common name for groups of small islands. (1) A group of small islands in the Red Sea about 40 miles northeast of Kosseir. (2) A group of small islands nearly east of Cape Guardafui and about 30 miles southwest of the island of Sakotra. (3) A group of small islands lying in the entrance to the Bight of Biafra, Gulf of Guinea, a little west of south of Princess Island. (4) A group of small islands lying in the Strait of Malacca off the northeast coast of Sumatra in about latitude 3° 30′ N. and longitude 99° 40′ E. (5) A group of small islands in about latitude 22° 5′ N. and longitude 75° 41′ W., near Columbus Bank of the Bahamas.

BROTHERS, LAY. An inferior class of monks, not in holy orders, but bound by monastic rules, and employed as servants in monasteries (q.v.).

BROTHERS, THE. A club founded, June 21, 1711, at London, for the purpose of advancing literature by sociability and the use of political influence. Besides several Tory peers, Saint John, Swift, Prior, Friend, and Arbuthnot were among its charter members. It became, in 1714, the *Scriblerus Club*, a more purely literary and less political organization, under the influence of Swift. The members addressed each other as 'brother.'

BROTHERS, THE. (1) A comedy by James Shirley, licensed November 4, 1626, and printed in a volume entitled *Six New Plays* by the same author, in 1653. (2) A tragedy by Edward Young, produced at the Drury Lane, March 3, 1752, for the benefit of a religious society. It

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was not very successful, running for eight nights and clearing only £400. It was written during the author's early life, and for a long time suppressed as inimical to his profession of clergyman. (3) A play by Richard Cumberland, brought out at Covent Garden in 1769. It was the first real comedy of the author, and gained for him the friendship of Garrick, by the flattery of the prologue.

BROTHERS, RICHARD (1757-1824). A religious fanatic. He was born at Placentia, Newfoundland, December 25, 1757, and was at one time a lieutenant in the British Navy, which he quitted on half pay in 1783, believing that a military life was inconsistent with a Christian profession. Having scruples against taking the oath requisite to enable him to receive his half pay, he was reduced to great distress, and ultimately placed in the workhouse for a brief period. He regained his liberty in 1792. Dating his first call from 1790, he announced himself, in 1793, the apostle of a new religion, "the nephew of the Almighty, and Prince of the Hebrews, appointed to lead them to the land of Canaan." In 1794 he published a book, entitled *A Revealed Knowledge of the Prophecies and Times*, etc.; and, in 1795, an exposition of the Trinity. He was the author of several other publications marked by a strange mixture of reason and insanity, which made a temporary sensation. In consequence of prophesying the death of the King and the destruction of the monarchy, he was committed to Newgate, but soon liberated. Some of his political predictions, especially in reference to the state of the Continent, were either altogether or partially fulfilled; and many persons were induced to sell their goods, and prepare to accompany him to his New Jerusalem, which was to be built on both sides of the river Jordan. Even men of ability and education were deluded into believing in him, two of the most eminent being Halhed, the Orientalist, and William Sharp, the celebrated engraver. As a dangerous lunatic, he was at length committed to a private asylum, but released in 1806, and died in London, January 25, 1824.

BROTHER SAM. A play adapted by Sothern and Buckstone in 1874, from John Oxenford's comedy of the same name. It is a continuation of *Our American Cousin*, the title character being the brother of Lord Dundreary, the hero of that play.

BROTHERS and **SISTERS OF CHARITY.** Under these names, there exist in the Roman Catholic Church two widely ramified beneficent societies for the nursing of the poor and sick in hospitals, without distinction of faith, rank, or nation. The order of the Brothers of Charity, or Compassionate Brothers, was established in 1540 at Seville, in Spain, by the Portuguese João de Dio (died 1550), who had served in Africa under Charles V. The funds for the purpose were obtained by begging. The primitive object of the society was the care of the sick and the reformation of women of immoral character; it was composed of lay members, under no rule. In the year 1752 the order received the Papal recognition, and was subjected to the rule of Saint Augustine. All the privileges of the mendicant orders were conceded to it in the year 1624, and it was then divided into a Spanish congregation, with a major-general in Granada, and an Italian or extra-Spanish congregation, with a major-general in Rome. The society became almost extinct on the Continent of Europe in the last century, being superseded by the Sisters of Charity. But it was revived by Rosmini Serbati in 1828, under the name 'Fathers of the Institute of Charity.' The European members of the order clothe themselves in black; the extra-European, who are under a separate general of their order in America, wear brown. Their services to distressed humanity continue to be held in high estimation. There are, in the Roman Catholic Church, several orders of female celibates devoted to the care of sick and of children, who are called 'Sisters of Charity,' or, from their dress, 'Gray Sisters.' The best known are the 'Sisters of Saint Vincent de Paul.' They were first called into existence in France in 1631, by Saint Vincent de Paul (born 1576), greatly assisted by the noble-hearted and self-devoted widow, Madame Louise (de Marillac) Le Gras. The Archbishop of Paris raised the society into an order 'The Daughters of Divine Love,' and its rule was confirmed by Pope Clement IX. in 1668. In 1765 it already numbered 224 convents. The French Revolution sorely interrupted the abundant and benevolent labors of the Sisters of Charity by the suppression and proscription of their convents in France; but Napoleon restored the order in 1807 by the convocation of a general chapter of the scattered sisters, under the presidency of the empress mother, and by the grant of the necessary funds; and there exist at present more than 300 associations in France, where, in the villages, elementary education is in great part conducted by them. They attend the sick in all the great hospitals. The novitiate covers five years and the vows are renewed each 25th of March. These Sisters of Charity of Saint Vincent de Paul were introduced into the United States by Eliza Ann Seton, at Emmettsburg, Md., in 1809. At first the American Sisters' rule was a frank adaptation of the French, but they were independent; but since 1850 they have been united to the French body and come under the authority of the Mother General in Paris, who is herself subject to the Superior-General of the Priests of the Congregation of the Mission. They had in this country, in 1901, 3600 members. See SISTERHOODS.

BROTHERS AND SISTERS OF THE FREE SPIRIT. A sect which sprang up along the Rhine toward the beginning of the Thirteenth Century, and afterwards spread into France and Italy. It based its peculiar tenets on the scriptural doctrine that "where the Spirit of the Lord is, there is liberty." Misconceiving the true nature of spiritual freedom, the members of this sect conceived themselves released not only from ecclesiastical discipline, but also from the commonest obligations of morality. They set aside the marriage tie, and indulged in licentiousness. A few even maintained the old Manichæan doctrine that the deeds of the body could not possibly affect the soul. Intellectually, they are said to have been inclined to Pantheism under the teachings of Amalric of Bène (q.v.). The synods of Cologne in 1306 and of Treves in 1310 decreed their suppression, and in the persecutions which followed they seem to have been completely dispersed, although a few traces of their influence could be found as late as the Sixteenth Century,

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for example, among the so-called Libertines of Geneva.

BROTHERS OF COMMON LIFE (also called BROTHERS OF GOOD WILL, and HIERONYMITES, or GREGORIANS, from their patron saints, Jerome and Gregory the Great). A fraternity founded at Deventer about 1376 by Gerhard Groote (q.v.), whose successor was Florentius Radewin (born 1350, at Leerdam in Holland; died 1400). Thomas à Kempis, who was associated with Radewin, wrote the lives of both these founders. The society grew very rapidly, and under Gerhard's instructions, helped to found several houses of Canons Regular of Saint Augustine with which it was allied. But the original society, which professed to be a copy of the earliest Christian communities, was composed of persons who desired to live a devout and ascetic life in community without formal vows. Community of goods, industry, care for the education of the young, and a tendency to promote reading of the Scriptures and public prayers in the vernacular, are among their characteristics. Despite the opposition of some of the older communities, they were recognized by several Popes and by the Council of Constance (1414-18). They became most numerous in the Netherlands and Germany, nearly every large town having one or more of their houses, but spread also to Italy and Portugal, so that by 1430 they reckoned more than 130 societies. The last was founded at Cambrai in 1505. They seem to have decayed after the outbreak of the Reformation, which carried to more extreme lengths what had been distinctive principles of theirs. A number of the brothers joined the reforming movement. Some of their educational institutions were taken over by the Jesuits. The most distinguished members of the society were Thomas à Kempis (q.v.), Gerhard Zerbold of Zutphen, and the learned Cardinal Nicholas Cusa. Consult Kettlewell, *Thomas à Kempis and the Brothers of Common Life* (London, 1884).

BROTHERS OF THE CHRISTIAN SCHOOLS. An order, commonly called Christian Brothers, established by Jean Baptiste de la Salle at Rheims in 1684 and sanctioned by Benedict XIII. in 1725, having for its object the furnishing of the poor with instruction. In Paris, in 1792, they refused to take the oath of obedience to the civil Constitution, and were driven from their houses and prohibited from teaching. In 1801 they returned and soon spread over France, Italy, and other countries. About 1830 they opened evening schools for adults. Their mother house is in Paris, where the Superior-General lives, and in 1900 they had 1100 houses, and altogether 1400 houses, with 13,000 brothers in charge of 2500 schools. There are in the United States: Province of Baltimore, 220 brothers, 6384 pupils; Province of New York, 446 brothers, 16,927 pupils; Province of Saint Louis, 197 brothers, 4100 pupils; Province of San Francisco, 106 brothers, 3125 pupils. See LA SALLE, JEAN BAPTISTE DE.

BROUCKÈRE, brōō'kâr', CHARLES MARIE JOSEPH GHISLAIN DE (1796-1860). A Belgian statesman, born in Bruges. He entered the artillery service and fought at Waterloo. In 1826 he was elected deputy to the States-General from the Province of Limburg. Here he was a prominent advocate of Belgian independence. He was Minister of Finance for the Provisional Government, and after the establishment of the representative monarchy was appointed by Leopold I. Minister of the Interior (1831), and soon afterwards Minister of War. He reorganized the army, but was attacked on the ground of extravagant expenditures, and resigned (1832). He was subsequently director of the mint, a professor in the free University of Brussels, and burgomaster of that city. Consult the *Life* by Juste (Brussels, 1868).

BROUCKÈRE, HENRI DE (1801-91). A Belgian statesman, born in Brügge. He became an advocate, was elected to the National Congress, and represented Brussels in the Chamber of Deputies from 1833 to 1848. In 1840 he became Governor of Antwerp, in 1844 of Liège, and from 1849 to 1852 was Belgian Minister at the Papal and other Italian courts. He was Minister of Foreign Affairs in the so-called 'Ministry of Conciliation,' formed after the overthrow of the Liberals, and in that capacity did much to restore friendly relations between Belgium and France. At one time he was also councilor of the Brussels Court of Appeals, and in 1855-70 represented Mons as a Liberal deputy.

BROUGH, FANNY. An English actress, niece of Lionel Brough (q.v.). She made her début in Manchester in 1869, when quite young, and appeared in London in 1870, as Fernande, at the Saint James Theatre. For a time she became a leading member of the 'Caste' company, and otherwise has also toured extensively in the provinces. Among her London engagements have been those in *Harvest* (Princess's Theatre, 1886); *Civil War* (with Mrs. Brown Potter at the Gaiety Theatre, 1887); *Little Lord Fauntleroy* (Terry's, 1888); *Dr. Bill* (Avenue, 1890); *The Henrietta* (ib. 1891); *Mrs. Othello* (Toole's Theatre, 1893); *The Eider-down Quilt* (1896). She has also played in the United States, where, in 1900, she appeared as Mrs. Reginald Mainwaring, Sr., in the production of *My Daughter-in-Law* (Lyceum, New York).

BROUGH, JOHN (1811-65). A famous Governor of Ohio. He was born in Ohio, and, as a printer's apprentice, earned his way through the State University. He published several Democratic journals, held minor political posts, and was regarded as the ablest speaker of his party in the State. In 1864 he was nominated for the Governorship of Ohio by the Republican Union Party, and was elected over Clement L. Vallandigham (q.v.) by the largest majority ever given for a Governor up to that time. As a Governor he was remarkably efficient, and though holding office only during a part of the Civil War period, is generally called 'the war Governor' of Ohio.

BROUGH, LIONEL (1836—). An English comedian, born at Pontypool, Monmouthshire. He was a son of Barnabas Brough, a dramatic author, and a brother of William and Robert, the 'Brothers Brough.' In his early life he was a journalist, beginning in a subordinate position in the service of the *Illustrated London News*, and being afterwards on the *Daily Telegraph*, of which he published the first issue, and at a somewhat later period on the *Morning Star*. For a time he gave 'ghost entertainments' at the Polytechnic Institution and elsewhere. He had made his first appearance on the stage in 1854,

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at the Lyceum, and at length devoted himself permanently to the drama in 1863, when he appeared at the Prince of Wales's Theatre, Liverpool. In his long subsequent experience, which has included tours in the United States and South Africa, he has gained popularity in a great variety of comic and burlesque rôles, one of the best known being that of Tony Lumpkin in *She Stoops to Conquer*, which he has played nearly eight hundred times. Among his other favorite parts have been those of *Paul* Pry, Captain John Smith in *La belle sauvage*, and Black Brandon in *My Poll and My Partner Joe*. In 1872 he was stage manager of the huge spectacular production of *Babil and Bijou*, at the Covent Garden Theatre. More recently he was for several years under the management of Beerbohm Tree, of the Haymarket and Her Majesty's theatres, appearing as the Laird in *Trilby* (1895) and in other of Mr. Tree's plays, both in England and America. In 1901 he was at the Haymarket in *Sweet Nell of Old Drury*.

BROUGHAM, brōō'*a*m *or* brōōm, HENRY PETER, Baron Brougham and Vaux (1778-1868). A British jurist, orator, statesman, and scientist, descendant of an ancient Westmoreland family. He was born in Edinburgh, September 19, 1778. On the maternal side he was a grand-nephew of the historian Robertson. He exhibited signs of precocious talent and energy, and at an early age was compared to the 'admirable Crichton.' He was a brilliant scholar, both at the Edinburgh High School and at the university, at the age of eighteen sending a paper, *Observations on Phenomena of Light*, to the Royal Society, which was read and printed in its *Transactions*. He spent some time in traveling on the Continent, and in 1800 was admitted to the Scottish bar. In 1802, with Jeffrey, Horner, and Sydney Smith, he founded the *Edinburgh Review*, and contributed eighty of its most powerful articles to the first twenty numbers. His liberal political views militated against his advancement in Scotland; and a reputation for eccentricity and indiscretion excluded him from any legal practice except the unremunerative work of the criminal courts. Aften seven years of this practice he sought a better field, and in 1808 passed at the English bar.

In London, Brougham first attracted notice at the bar of the House of Commons as counsel for the Liverpool merchants who petitioned against certain orders-in-council. In 1810 he entered Parliament, and soon after brought in and carried an act making participation in the slave trade felony. He was welcomed by the Opposition leaders as a powerful assistant in their attacks upon the Government. He succeeded in carrying the repeal of the orders-in-council shortly before the general election of 1812, and contested the membership for Liverpool against Canning. He was defeated, and remained without a seat in Parliament till 1816, when he was returned for Winchelsea. He established a reputation in the law courts by speeches of great ability in the defense of persons prosecuted for libel by the Crown. His most famous appearance as an advocate was in defense of Queen Caroline in 1820. His eloquence and boldness forfeited him the favor of the Crown, but gained him that of the people, and between 1820 and 1830 Brougham was the popular idol. He made good use of his power. In 1822 he supported, though in vain, a scheme of national education, and to his activity was due in great measure the establishment of the London University, of the first Mechanics' Institute, and of the Society for the Diffusion of Useful Knowledge. In 1830, Brougham delivered a powerful speech against slavery, and in consequence of it was returned as a member for Yorkshire. The aristocratically disposed Whigs would have excluded him from the Reform Ministry of Earl Grey; but, in addition to enormous popularity, he was virtually their leader in debate in the Commons, and was indispensable. The same year, after various intrigues, he was offered the appointment of Lord Chancellor and a peerage as Baron Brougham and Vaux, which he accepted against his interests and inclinations. He assisted materially in carrying the great measures proposed by the Liberal Ministers. He, however, developed eccentricity, and by arrogance and self-importance shared in the general unpopularity which afterwards attached to the Ministry. When it was dismissed by William IV. in 1834, Brougham left office, never to return. After that time he held in the Upper House a position analogous to that formerly held by him in the Commons, criticising freely the conduct of successive administrations, but steadily forwarding every measure for social progress.

He is best remembered as a law reformer. In 1827, in a memorable speech which occupied six hours in delivery, he enumerated the defects in nearly every branch of English law, and made proposals for dealing with law reform on a proper scale. Among the measures proposed were bills for the codification of the criminal law, for the establishment in England of a system of public prosecutors, and for the giving of compensation to parties acquitted. Lord Brougham's acts and bills touching on law reform, as well as those regarding the slave trade, education, and other public questions, were collected and published by Sir J. E. Eardly Wilmot (London, 1857). The volume forms a fitting monument to the activity, perseverance, and public spirit of the man.

As an orator and parliamentary debater, among his contemporaries he was inferior only to Canning. His speeches, however, had too large an admixture of exciting elements; argument was mingled with fiery declamation; ridicule, sarcasm, invective, were freely used; and these he employed with a vehemence and energy that at times carried him beyond bounds. He possessed the power of ready, rapid, and forcible diction. Brougham also won repute in other fields. He cultivated the mathematical and physical sciences, and ventured upon the domain of metaphysics, and even of theology. His miscellaneous writings upon an incredible variety of subjects served the purposes of the moment, and display great powers of rapid comprehension and nervous, clear exposition, but contain few new truths in politics or morals, and no original discoveries in science. Brougham acquired the honors due to men of letters, and was successively made lord rector of Glasgow University, president of University College, London, member of the Institute of France, chancellor of the University of Edinburgh, and lastly, D.C.L. of Oxford.

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During and subsequent to his Chancellorship, his public appearances in a little carriage specially built for him excited curiosity. This vehicle became associated with his name, and was the forerunner of the modern 'brougham.' When not engaged in Parliament, Lord Brougham resided chiefly at Cannes, in the south of France. The growth and prosperity of this seaside resort is mainly due to Brougham, and he is kept in remembrance by a monument erected by the grateful inhabitants. He died there, May 7, 1868. He left a memoir of his *Life and Times*, 3 vols. (New York, 1871). Written in his old age, it contains exaggerated statements; while the partisan tone of his biographers is also unreliable. See his *Works* (11 vols., 1855-62), and consult Campbell, *Lives of Lord Lyndhurst and Lord Brougham* (London, 1869).

BROUGHAM, JOHN (1810-80). An Irish actor and playwright. He was born in Dublin, May 9, 1810. Educated as a surgeon, a reverse of the family fortunes led him to the London stage in 1830, where he achieved success as an actor and writer of light burlesque, and collaborated with Dion Boucicault in the comedy *London Assurance*. For a time he managed the London Lyceum, but moved in 1842 to the United States, where he became a member of the stock company of Burton's Theatre, in New York, for which he wrote several now-forgotten comedies. He then undertook the management of Niblo's Garden, and in 1850 opened Brougham's Lyceum (later Wallack's Theatre), an unsuccessful venture. Then he became manager of the Old Bowery Theatre, and finally accepted an engagement at Wallack's, and soon after at Burton's. For all these theatres he wrote dramas of ephemeral interest, such as *Playing with Fire* and *The Game of Love*. The years of the Civil War he passed in England. Returning to New York, he made another unsuccessful attempt in theatrical management. His last appearance on the stage was at Booth's Theatre, October 25, 1879, and he died June 7, 1880, in New York City. He was the founder of the New York Lotus Club, and for some time its president. He also launched a short-lived comic paper, *The Lantern* (1852), and published two volumes of miscellanies, *A Basket of Chips* (1855) and *The Bunsby Papers*. In all, he wrote about one hundred plays, none of them noteworthy.

BROUGHTON, brou'ton, HUGH (1549-1612). A Protestant Bible scholar. He was born at Owlbury, Shropshire, England, and educated at Cambridge. At an early age he distinguished himself as a Hebrew scholar, and wrote and spoke Hebrew, Greek, and Latin. He was a Puritan preacher in London for a while, but deemed it prudent to retire to the Continent in 1589, because the bishops thought his views dangerous. Henceforth he went back and forth, and from 1603 to 1611 was pastor of the English congregation at Middelburg, Holland. He died in London, August 4, 1612. Though as early as 1593 he had projected a new translation of the Bible, and his fitness for the work was universally acknowledged, he had no part in King James's Version. This was a great disappointment to him, and he criticised the version unsparingly. John Lightfoot, a still greater Hebrew scholar, edited his literary remains, with a life (London, 1662).

BROUGHTON, brou'ton, JOHN CAM HOBHOUSE, Baron (1786-1869). An English statesman and writer, the friend of Byron. He was born in Bristol, June 27, 1786. He was educated at Westminster and at Cambridge, where, in 1808, he obtained both the Hulsean prize and his B.A. degree, graduating M.A. in 1811. In 1809 he visited Spain, Portugal, Albania, Greece, and Turkey, with Byron. In 1813 he followed the allied armies, and was present at the battle of Dresden and at Paris when Louis XVIII. returned in 1814. When Napoleon escaped from Elba, Hobhouse again sought Paris, and the following year published the *Hundred Days in Paris*. The work, of Napoleonistic sympathies, gave great offense both in England and France. The translator and printer in Paris were sentenced to fine and imprisonment for an 'atrocious libel,' and in London Hobhouse was confined in Newgate nearly three months. On his release he joined Byron near Geneva, and together they visited Venice and Rome. As a martyr to Toryism, in 1819, he unsuccessfully contested the parliamentary borough of Westminster, but the following year he was elected by a large majority. For 12 years he was an advocate of liberal measures, among them the repeal of the Test and Corporations acts and Roman Catholic emancipation. In 1831 he succeeded to his father's baronetcy, and in the same year was Secretary of War in the Grey Ministry. Subsequently he was chief commissioner of woods and forests and president of the board of control. In 1851 he was raised to the peerage and created Baron Broughton. At his death, June 3, 1869, the title became extinct, while the baronetcy passed to his nephew. Lord Broughton published: *Imitations and Translations from the Classics* (1809); *Journey Through Albania and Other Provinces of Turkey* (1812); and *Historical Illustrations of the Fourth Canto of Childe Harold* (1818). As Byron's intimate friend he was dissuaded from replying to Lady Byron's *Remarks*, but wrote a manuscript, now in possession of Lady Dorchester, containing a "full and scrupulously accurate account of the separation, to be used if necessary."

BROUGHTON, PHYLLIS. An English actress, who began her career as a London music-hall dancer, and afterwards gained popularity in light comedy. Among the plays in which she has appeared are: *The Forty Thieves* (1880); *Whittington and His Cat* (1881); *Aladdin* (1881); *Paul Jones* (1889); *Marjorie* (1890); *Blue-eyed Susan* (1892); *In Town* (1892); and *Gentleman Joe* (1895).

BROUGHTON, RHODA (1840—). A popular English novelist. She was born in North Wales, but has spent much of her life in Oxford. Among her works, all of which are clever and entertaining, but of inferior literary quality, are: *Cometh Up as a Flower* (1867); *Not Wisely but too Well* (1867); *Red as a Rose is She* (1870); *Nancy* (1873); *Belinda* (1883); *Doctor Cupid* (1886); *Alas!* (1890); *Scylla or Charybdis* (1895); *Dear Faustina* (1897); and *Foes in Law* (1901).

BROUSSA, brōōs'sȧ. See BRUSSA.

BROUSSAIS, brōō'sȧ', FRANÇOIS JOSEPH VICTOR (1772-1838). A French physician. He

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was born at Saint Malo, France, and was educated in the Dinan Public School. He volunteered at the outbreak of the Revolution, but ill health caused his discharge from the army. He then studied medicine under his father, who was a physician, and returned to the service with a surgeon's commission, being attached first to the army and later to the navy. In 1799 he began a course of medical study in Paris. From 1804 to 1808 he was again a surgeon in the army, and from 1808 to 1814 he was chief physician of a division of the French Army in Spain. In 1820 he was appointed professor at the military hospital of Val-de-Grâce, in Paris, after serving a few years as assistant professor. In 1830 he became professor of general pathology and therapeutics in the Faculty of Medicine in Paris, and afterwards was made a member of the Institute. In 1841 a statue was erected to his memory in the court of Val-de-Grâce. Broussais's peculiar views are ably explained in his chief works—the *Histoire des phlegmasies ou inflammations chroniques* (1808) and *Examen de la doctrine médicale généralement adoptée* (1816)—which assert the following principles: No life is possible without excitation or irritation. As long as the excitation is evenly distributed throughout the organism and remains within certain limits of intensity, the processes of life go on in a normal physiological manner; but if the limits are exceeded, i.e. if excitation becomes either too strong or too weak, the result is a condition of disease. Disease, originally local and generally caused by local over-excitation, gradually spreads in the body by physiological sympathy, and thus becomes general. The organs most subject to local over-excitement are the stomach and the intestines, and hence a great many general diseases are directly traceable to local disease of these organs. Broussais's ideas, which bear an unmistakable resemblance to those of the Brunonian system of medicine, gained many adherents, especially in France, who took the name of 'the Physiological School.' The historical importance of the theory lies in the fact that it has led to a careful study of physiological sympathies and of pathological anatomy, and thus to the building up of important chapters of modern medical science. Besides the works already mentioned, Broussais wrote: *Traité de la physiologie appliquée à la pathologie* (1824); *Commentaires des propositions de pathologie consignées dans l'examen* (1829); and *Le choléra morbus épidémique* (1832). Consult Montègre, *Notice historique sur la vie, les travaux et les opinions de Broussais* (Paris, 1839); and Reis, *Etude sur Broussais et sur son œuvre* (Paris, 1869). See BROWN, JOHN.

BROUSSON, brōō'sôn', CLAUDE (1647-98). A French Protestant martyr, an advocate and legal defender of the Huguenots. His house was the rendezvous of certain Protestant leaders, and he was compelled to fly from his native city (Toulouse), barely escaping into Switzerland. He ventured into France twice afterwards, at great peril, to preach and give comfort to his co-religionists. Finally, in 1698, after a great price had been set on his head, he was caught, and on the flimsy charge of treason, in conspiring with the Duke of Schomberg to invade France, he was sentenced to be broken on the wheel. He left a large number of works, one of which was *L'état des réformés de France* (1685). Consult Payne, *The Evangelist of the Desert* (1853).

BROUSSONET, brōō'sô'nā', PIERRE MARIE AUGUSTE (1761-1807). A French naturalist. He received his doctorate when only 18, and visited London, where he published his *Ichthyologiæ Decas Prima* (1782), and was made a member of the Royal Society. He returned to Paris in 1783, taught in the College of France, reorganized the Society of Agriculture, and in 1785 was made a member of the Academy of Sciences. He was elected to the Legislative Assembly, but under the Convention was suspected of being a Girondist and fled to Spain. He went as physician to an embassy which the United States sent to Morocco, and afterwards was French consul at Teneriffe. In 1805 he was appointed professor of botany at Montpellier. Broussonet is stated to have been the first to introduce the Angora goat and Merino sheep into France. He published many memoirs on botany and ichthyology.

BROUWER, brou'ẽr, ADRIAN. See BRAUWER.

BROWDIE, brou'dĭ, JOHN. A gigantic Yorkshireman in Dickens's *Nicholas Nickleby*. Although somewhat suspicious of Nicholas at their first meeting, he later becomes his firm friend, he rescues the recaptured Smike, and is finally married to the bewitching Tilly Price. He also brings the news of Squeers's imprisonment to Dotheboys Halls, and encourages the pupils in making their escape. See PRICE, MATILDA.

BROWER, DANIEL ROBERTS (1839—). An American physician, born in Philadelphia, Pa. He graduated at the Polytechnic College there in 1860, at the medical department of the University of Georgetown in 1864, and in that year was appointed assistant surgeon of United States Volunteers. From 1868 to 1875 he was medical superintendent of the Eastern Lunatic Asylum of Virginia (Williamsburg), and later became professor of nervous and mental diseases in the Rush Medical College of Chicago, Ill. He was also appointed professor of nervous diseases in the Woman's Medical College of the Northwestern University (Evanston), and in the Postgraduate Medical School. For several years he was editor of the *Medical Journal*, and he has published numerous monographs.

BROWN, AARON VENABLE (1795-1859). An American politician. He was born in Virginia, but later removed to Tennessee. He practiced law for a time in partnership with James K. Polk, and was a member of Congress from 1839 to 1845, when he was elected Governor of Tennessee. In 1852 he was a delegate from Tennessee to the National Democratic Convention in Baltimore, where he reported the platform ultimately adopted by the Democratic Party. From 1857 until his death he was Postmaster-General of the United States, and as such he established a route to California by way of the Isthmus of Tehuantepec, an overland route from Saint Louis, and a third across the continent by way of Salt Lake. His speeches were published in Nashville (1854).

BROWN, ALEXANDER (1843—). An American historical writer, the author of several books on the early history of Virginia. He was born in Glenmore, Va., studied for a short time at Lynchburg College, served in the Confederate

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Army throughout the Civil War, and since then has been engaged in mercantile pursuits and farming. He has devoted most of his time, however, to the study of the early history of Virginia, from the standpoint of the Virginia Company, and by his writings has connected his name with the view that the commonly accepted account of the early Virginia history, based almost solely, as it is, on works and documents approved by the Court party, is largely inaccurate, and is grossly unjust to the original founders and their patrons. To establish this thesis, and to correct current misconceptions and misjudgments, has been the aim of the various volumes published by him. Besides numerous magazine articles and papers read before historical societies, he has written: *New Views on Early Virginia History*, a pamphlet (1886); *The Genesis of the United States*, 2 vols. (1890), a valuable collection of previously unprinted historical manuscripts and of rare tracts; *The Cabells and Their Kin* (1895); *The First Republic in America* (1898), an account of the early history of Virginia; *The History of Our Earliest History* (1898); and *English Politics in Early Virginia History* (1901).

BROWN, Benjamin Gratz (1826-85). An American politician. He was born in Lexington, Ky.; graduated at Yale in 1847; practiced law in Saint Louis; and during 1852-58 was a member of the Legislature. In 1854 he started the *Missouri Democrat*. In the Civil War he fought on the Union side, and rose to the rank of brigadier-general of volunteers. He served as United States Senator from Missouri (1863-67), and in 1871 was elected Governor of the State. In 1872 he was candidate for Vice-President on the ticket headed by Horace Greeley.

BROWN, Charles Brockden (1771-1810). An American novelist and editor. He was born in Philadelphia, January 17, 1771. As a boy he was very precocious and at the age of 11 he entered the school of Robert Proud, an historian and noted teacher, where he remained for five years, and by zealous application to his books frequently overtaxed his naturally weak constitution. He never after enjoyed perfect health. On leaving school he studied law, but soon chose literature as his profession. He wrote much verse and practiced his pen in numerous essays for a belles-lettres club, of which he was the leading spirit. He now drew gradually away from the Quaker modes of life and thought, and yielded to the influence of the current French philosophy, and to the social teachings of Godwin and other English radicals. Growing out of touch with his Philadelphia surroundings, he moved to New York, and in 1797 published *Aleuyn: A Dialogue on the Rights of Women;* but its radical teaching on divorce attracted little attention. The next year he issued his first novel *Wieland, or the Transformation*, a story of ventriloquism. This was his third attempt at fiction, and parts of an earlier novel, *Sky Walk*, were afterwards incorporated in *Edgar Huntley*. Both of these early novels are tales of terror, improbable, sometimes horrible, but with scenes of great power, though as radically morbid as the work of his master, Godwin. During the next three years he published four other novels—*Arthur Mervyn, Ormond, Edgar Huntley*, and *Clara Howard*—establishing his rank as the first and unrivaled American novelist, until the appearance of Cooper's *Spy* (1821). During this period of feverish activity, Brown attempted to establish a *Monthly Magazine and American Review*, which did not outlive its second year. He was more successful in 1803, with the *Literary Magazine and American Register* (1803-08), and in 1806 began to issue a semi-annual *American Register*, which continued till his death, from consumption, February 22, 1810. He published also another novel, *Jane Talbot* (1801), did some translating, and wrote several political pamphlets, of which the most noteworthy is an *Address to Congress on the Utility and Justice of Restrictions on Foreign Commerce*. Death found him engaged in completing a *System of General Geography* and a *Treatise on Rome During the Age of the Antonines*. Brown made early use of American frontier life. Thus he suggests Cooper, while his morbid psychology has a tinge of Poe, and sometimes seems precursive of Hawthorne. Like the English novelists of his school, his work is improbable, sentimental, and unreal. In construction it shows marks of haste, but it never fails to bear witness to native genius. There is a weird intensity of power in *Wieland*, and the description given in *Arthur Mervyn* and *Ormond* of the yellow-fever epidemics in Philadelphia is generally acknowledged to be masterly. Prescott, Margaret Fuller, and others have praised him highly, but he has not held his popularity. He should be remembered as the first really professional American man of letters. His novels were collected in seven volumes (1827), with a *Life* by Dunlap, originally published in two volumes (1815). These volumes contain many minor writings of Brown. The works were reëdited in six volumes (Philadelphia, 1857), and again by McKay (1887). For his biography, consult also: Prescott, *Biographical and Critical Miscellanies* (Philadelphia, 1867).

BROWN, Ford Madox (1821-93). An English painter. He was born in Calais, France, of English parentage; studied art on the Continent, and in 1844 sent to Westminster Hall two cartoons which won the admiration of Haydon and of Dante Rossetti. A warm friendship between Rossetti and himself resulted, and when the former founded the Pre-Raphaelite Brotherhood, Brown, though he held himself aloof from actual membership in the society, was generally looked upon as one of its master spirits. Among his best-known pictures are "Wicliff Reading His Translation of the Scriptures" (1848); "King Lear" (1849); "Chaucer at the Court of Edward III." (1851); "Christ Washing Peter's Feet" (1852); "Work" (1868); "Don Juan" (1870); and an historical series in the Town Hall, Manchester, 1890. Consult Hueffer, *Ford Madox Brown: A Record of His Life and Work* (London, 1896), containing numerous reproductions.

BROWN, Francis (1849—). An American educator. He was born in Hanover, N. H., and graduated at Dartmouth in 1870, and at Union Theological Seminary, New York City, as fellow of his class, in 1877. He then studied in Germany (1877-79), was appointed instructor in biblical philology at the Union Theological Seminary in 1879, and became associate professor of biblical philology there in 1881, and professor of Hebrew and the cognate languages in 1890. He has published some minor scholarly works, *As-*

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syriology: Its Use and Abuse in Old Testament Study (1885), and contributions to periodicals, but his chief attention has, since 1883, been given to the preparation, in collaboration with Drs. Briggs and Driver, of the *Hebrew and English Lexicon of the Old Testament* (New York, 1891, part 9, 1901), based on Gesenius.

BROWN, Sir George (1790-1865). A British soldier. He was born in Scotland; entered the army in 1806, and was present at the capture of Copenhagen. He distinguished himself in the Peninsular War, was sent with General Ross to the United States in 1814, was severely wounded at the battle of Bladensburg, and was promoted to be a lieutenant-colonel for his gallantry. For the next twenty-five years he served as a staff officer, becoming adjutant-general in 1850, and lieutenant-general in 1851. He then served in the Crimean War (1854-55), and at the battle of Inkerman (November 5, 1854) he was severely wounded, and obliged to retire for a short time to Malta. In the expedition to the Sea of Azov, he commanded the British troops; and in the first unsuccessful attack on the redan of Sebastopol, he had the chief command of the storming party. He was created G.C.B. in 1855, and the next year was raised to the rank of general. In 1860 he became commander-in-chief in Ireland.

BROWN, George (1818-80). A Canadian journalist and statesman. He was born in Scotland, but removed to New York in his youth, and in 1843 settled in Toronto, where he founded the *Globe* newspaper (1844). He entered Parliament in 1852, and in 1858 formed the Brown-Dorian Ministry. Three days later he resigned in consequence of a vote of want of confidence. From 1864 until his resignation in 1865, he was leader of the Conservatives in the coalition Government. He entered the Senate in 1873, and in 1874 was joint plenipotentiary with Sir Edward Thornton to negotiate a commercial treaty with the United States. In 1880 he was shot by a discharged employé, and died a few weeks later. Consult Mackenzie, *Life and Speeches of the Hon. George Brown* (Toronto, 1882).

BROWN, George (1835—). An American naval officer. He was born in Indiana, and entered the navy as a midshipman in 1849. He served throughout the Civil War, especially distinguishing himself on the night of February 24, 1863, when, in command of the *Indianola* at Palmyra Island, he defended himself for an hour and a half against four Confederate gunboats. Finally he was wounded and taken prisoner and his vessel was destroyed. He became a commander in 1866 and a rear-admiral in 1893. From that time until his retirement in 1897 he commanded the Norfolk, Va., Navy Yard.

BROWN, George Loring (1814-89). An American painter, born in Boston. He first studied wood-engraving under Alonzo Hartwell, and when sixteen went abroad and remained two years. On his return he became a pupil of Washington Allston. In 1840 he went to Paris and entered Isabey's studio. Among his pictures are "Doge's Palace and Grand Canal," "Bay of Naples," and "A Moonlight Scene." "The Crown of New England" (1861) and the "Bay of New York" (1860) were acquired by Edward VII. One was bought by him, and the other given him on his visit to America when he was Prince of Wales.

BROWN, George William (1812-90). An American jurist. He was born in Baltimore, Md., graduated in 1831 at Rutgers, was subsequently admitted to the bar, and was elected mayor of Baltimore in 1860. On April 19, 1861, he marched through the city at the head of the Sixth Massachusetts Regiment, then on its way to the defense of Washington, and exerted himself to the utmost to quell the riot which had arisen. He was a member of the Maryland constitutional convention of 1867, and Chief Justice of the State Supreme Court from 1873 to 1888. For a number of years he was professor of international and constitutional law in the University of Maryland, and he was one of the three compilers of the first *Digest of the Decisions of the Maryland Court of Appeals* (1847). He published numerous addresses, such as *The Origin and Growth of Civil Liberty in Maryland* (1850), besides a *Sketch of the Life of Thomas Donaldson* (1881), and *Baltimore and the 19th April, 1861* (1887).

BROWN, Goold (1791-1857). An American grammarian. He was born in Providence, R. I., and for twenty years was a teacher in New York. He published a series of excellent English grammars, including *A Grammar of English Grammars* (1851), an exhaustive and highly valuable treatment of the subject.

BROWN, Harvey (1796-1874). An American soldier, born in Bridgetown (now part of Rahway), N. J. He graduated at West Point in 1818; was aide-de-camp to Major-General Brown, then commanding general of the United States Army, in 1824-25; and, as lieutenant-colonel, took part in the Seminole War of 1835-38. In the Mexican War he served as major under both General Taylor and General Scott, and earned special mention for gallantry at Monterey, Cerro Gordo, Contreras, and the Gate of Belen, City of Mexico. For his services in the last two engagements he was brevetted lieutenant-colonel and colonel respectively. In 1852-53 he again served against the Seminoles in Florida and in 1859-60 was inspector of artillery. At the outbreak of the Civil War he was in command at Washington and Fort McHenry (from January to April, 1861), and was then placed in command of Fort Pickens, Fla., where he earned the brevet rank of brigadier-general by his 'gallantry and good conduct' in repulsing a Confederate attack on November 22-23, 1861. He was afterwards in command of the defenses of New York Harbor from April, 1862, to August, 1863, was military commander of the city of New York from January 15 to July 16, 1863, and earned the brevet rank of major-general for his distinguished services in the suppression of the riots there on July 13-16. (See Draft Riots, The.) On August 1, 1863, he was retired from active service.

BROWN, Henry Billings (1836—). An American jurist, one of the associate justices of the United States Supreme Court. He was born in Lee, Mass., graduated at Yale in 1856, traveled in Europe for a year, and upon his return studied law at the Yale and Harvard Law Schools. He then removed to Detroit, Mich., where he was admitted to the bar in 1860. From 1863 to 1868 he was assistant United States district attorney

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for the Eastern District of Michigan, and for several months in 1868 he was judge of the Circuit Court of Wayne County. In 1875 he was appointed by President Hayes United States district judge, which position he held until December, 1890, when he was appointed by President Harrison to the vacancy on the Supreme Court bench caused by the death of Justice Samuel Miller. In 1895 he compiled a valuable volume of admiralty reports.

BROWN, Henry Kirke (1814-86). An American sculptor, well known for works in bronze. He was born in Leyden, Mass., studied portrait painting in Boston, spent several years in Italy, and then settled in Brooklyn, N. Y. He made the first bronze statue ever cast in the United States. His best-known statues are those of De Witt Clinton (in Greenwood Cemetery, Brooklyn), of Nathaniel Greene and of General Scott (in Washington), and of Lincoln (in Union Square, New York). In 1857 he undertook the decoration of the State House, Columbia, S. C., which, however, was destroyed during the Civil War. He also made portrait busts of William Cullen Bryant and Dr. Willard Parker.

BROWN, Jacob (1775-1828). An American soldier, prominent as an officer in the War of 1812. He was born in Bucks County, Pa., removed to New York in 1798; taught school and studied law in New York City; served as military secretary to Alexander Hamilton, and, removing to Jefferson County, founded the village of Brownsville. He here entered the State militia, was made brigadier-general in 1810, and early in 1812 was placed in command of the frontier from Oswego to Lake Saint Francis. He gained successes over the British at Ogdensburg and Sackett's Harbor on October 4, 1812, and May 29, 1813, respectively; and in July, 1813, was appointed brigadier-general in the regular United States Army. In January, 1814, he was raised to the rank of major-general, and soon afterwards succeeded Wilkinson as commander of the Northern Department, though nominally Izard, who was then busy with the Wilkinson court of inquiry, was his superior. He took possession of Fort Erie on July 2, defeated General Riall at Chippewa (where General Scott commanded) on the 5th, and on the 25th defeated General Drummond in the battle of Lundy's Lane, General Scott having the principal share in the victory. After the war he remained for some time in command of the Northern Department, and from 1821 until his death he was general-in-chief of the United States Army.

BROWN, J. Appleton (1844-1902). An American painter, born in Newburyport, Mass. He studied in Boston under Benjamin C. Porter, and afterwards under Emile Lambinet in Paris. In 1891 he established his studio in New York City, and the following year became a member of the Society of American Artists. His last picture, exhibited at the Society in 1902, "The Grain Field," was a typical example of his delicate personal handling of color. Other works by him are: "Old Road Near Paris," and "On the Merrimac at Newburyport."

BROWN, John, of Haddington (1722-87). A Scottish clergyman and commentator. He was born at Carpow, in Perthshire. He showed an early disposition to piety, and a taste for learning as well. While herd-boy to a shepherd on the hills, he acquired a good knowledge of Latin, Greek, and Hebrew, so astonishing the countryfolk by his attainments that they credited him with diabolical assistance. After a brief career as a peddler, he enlisted in a regiment of militia raised against the Jacobites in 1745; after the need for these services was over, he became a schoolmaster near Kinross, studying theology in his spare hours. In 1750 he was licensed as a preacher, and in the following year set over the congregation of Haddington, which he never left, though called (in 1784) to the pastorate of the Dutch Church in New York. His holy and devoted character was universally respected. David Hume was once prevailed upon to go and hear him, and is said to have exclaimed: "That old man preaches as if Christ were at his elbow." His best-known work was the *Self-Interpreting Bible* (1778), a complete library of scriptural knowledge, long immensely popular in Scotland. He published a great variety of sermons and tracts. For his life, consult the preface to his *Select Remains*, ed. by his son, the Rev. William Brown (Edinburgh, 1856).

BROWN, John (1800-59). An American abolitionist of the extremely radical type. He was born in Torrington, Conn., May 9, 1800, of Puritan ancestry. In his earlier years he engaged in the wool business and in a variety of other pursuits, in all of which he was uniformly unsuccessful. He was twice married, and became the father of a score of children, but he seems not to have shown either the disposition or the ability properly to maintain a family. His roaming career in Ohio, Connecticut, and New York was not such as to secure for him the standing even of an average citizen. He was, however, a man of much natural force, and upon becoming imbued with the single idea which controlled his later life he appeared as an agitator of great power, although manifesting many of the characteristics of the fanatic. His life work has given rise to a marked diversity of opinion, some considering his deeds highly reprehensible if not criminal, while others have regarded his life and death as scarcely different from those of a martyr. The latter view was early prevalent throughout the North, and was upheld by many reputable abolitionists (q.v.), by the leaders among whom Brown seems to have been encouraged and assisted from the beginning of his work in Kansas until the time of the final catastrophe in Virginia. Brown first appeared as a public character in the struggle which the free-State men were making for the control of Kansas (q.v.). He was somewhat prominent at Lawrence in the critical days of December, 1855, and soon made himself notorious by the massacre of five of his opponents at Pottawatomie on the night of May 24, 1856.

This was followed, on June 2, by his capture at Black Jack of Captain Pate. In the following August he won national renown by the heroic stand which he made at Osawatomie against an overwhelming force of invaders from Missouri. While he thus took a most vigorous share in the critical border war, he became the exponent of the bloodiest and most unscrupulous type of frontier ruffianism. After the conclusion of violence in Kansas Brown seems to have maintained relations with his respectable and wealthy sympathizers in the Northeastern States, and by

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them he was encouraged and materially aided in his efforts to free the blacks. The culmination of long secret planning came in the fall of 1859, when, after having as a blind taken a farm near his objective point, he led a band of fewer than a score of followers into Harper's Ferry on the night of October 16, 1859, and seized the national arsenal, thus giving what he supposed would be the signal for a general insurrection of the slaves. This audacious act, however, resulted only in calamity for the participants, and in so embittering and arousing the South as to make any peaceful arrangement of the slavery problem a still more remote probability. Troops of the regular army, under command of Robert E. Lee (q.v.) soon regained control of the arsenal, and captured Brown and his followers. Brown was tried, convicted of "treason, and of conspiring and advising with slaves and others to rebel, and of murder in the first degree;" was sentenced to death, and was executed at Charlestown, W. Va., December 2, 1859. He was buried at North Elba, N. Y. During the following years a popular song in the North had the refrain:

"John Brown's body lies a-moldering in the grave,
But his soul goes marching on."

The general approval of his deed in the North served only to impress upon the South the extremes to which certain Northerners might go, and the futility of hoping for any uncontested maintenance of slavery in the Union. Brown's biographer, Sanborn, has said: "Although John Brown would have justified a slave insurrection, or indeed almost any means of destroying slavery, he did not seek to incite general insurrection among the Southern slaves. The venture in which he lost his life was not an insurrection in any sense of the word, but an invasion or foray." On the other hand, a recent writer, speaking of the Harper's Ferry affair, has said that "it was crime, and nothing but crime, common crime and public crime, crime that made violent and destructive means possible and actual, and seemingly necessary for the attainment in the United States of that principle of the world's civilization which has decreed the personal freedom of all men." Of his twenty children, eight died in early childhood. The sons who grew to manhood took an active part in their father's work and obeyed him implicitly. Five of them removed to Kansas in 1854 and immediately entered with enthusiasm into the struggle with the pro-slavery settlers; and four of them participated in the Harper's Ferry raid, of which Owen Brown, who died in 1889, was long the only survivor. A work entitled *Life and Letters of John Brown, Liberator of Kansas and Martyr of Virginia*, edited by F. B. Sanborn (Boston, 1885), gives a sympathetic and exhaustive biography. For an unfavorable estimate of Brown, consult Burgess, *The Civil War and the Constitution* (New York, 1901). For a judicial estimate, consult Rhodes, *History of the United States from the Compromise of 1852* (New York, 1893).

BROWN, JOHN (1736-88). A Scottish physician, the founder of the Brunonian system of medicine. He was born at Buncle Parish, Berwickshire, the son of a day laborer. He was educated at the grammar school of Duns, in which he was subsequently an usher, and after studying medicine at the Edinburgh University, became tutor to the children of the celebrated Dr. Cullen, and assistant in his university lectures. He took the degree of M.D. at the University of Saint Andrews in 1779, and in 1780 published his *Elementa Medicinæ*. According to his system, all diseases are divided into the sthenic, or those depending on an excess of excitement, and the asthenic, those resulting from a deficiency of it; the former to be removed by debilitating medicine, as opium, and the latter by stimulants, such as wine and brandy. His system gave rise to much opposition, but his partisans were numerous, and for a time his opinions had some influence. He was also the author of *Observations on the Old System of Physic* (1787). In 1780, overwhelmed with debt, he removed to London, where he died of apoplexy in 1788. His works, with a memoir by his son, Dr. William Cullen Brown, appeared in 1804 (3 vols.).

BROWN, JOHN (1736-1803). An American merchant, born in Providence, R. I., the most energetic of the four sons of James Brown (1666-1732), commonly known as the 'Brown brothers.' He was very successful in business, and was also prominent in politics, especially during the Revolutionary War. Foreseeing this conflict, he brought to this country in his ships large quantities of powder which was supplied to the army at Cambridge when the soldiers had only about four rounds to the man. He organized and led the party which, on June 17, 1772, destroyed the British sloop-of-war *Gaspée*, and was active in the anti-slavery movement. He served in Congress from 1799 to 1801. For twenty years he was the treasurer of the Rhode Island College (now Brown University). He laid the corner-stone of the first building of that institution, and contributed generously to its endowment fund.

BROWN, JOHN (1744-80). An American soldier, born in Sandisfield, Mass. He graduated at Yale in 1771, studied law in Providence, and practiced his profession in what is now Johnstown, N. Y., where he became a King's attorney. In 1774 he was sent to Canada to urge the people there to join the thirteen Colonies in their opposition to the arbitrary measures of the British Government. He was with Ethan Allen at the capture of Ticonderoga, and at Quebec when Montgomery was killed. Soon afterwards he was made a lieutenant-colonel in the Continental Army. In 1777 he surprised the outposts at Ticonderoga, was with Gates when Burgoyne surrendered, and was killed by Indians while on the way to help Schuyler in the Mohawk Valley campaign of 1780.

BROWN, JOHN, D.D. (1784-1858). A Scottish religious author, grandson of John Brown of Haddington. He was born July 12, 1784, near Whitburn, Linlithgowshire. He studied in Edinburgh University (1797-1800) and the theological hall of the church in Selkirk (1800-04). In 1806 he was ordained to the pastorate of a Burgher church in Biggar, a small town in Lanarkshire, where he labored for fifteen years, employing his leisure hours in those studies which subsequently enabled him to take a high rank as a biblical expositor. In 1822 he was transferred to Rose Street Church, Edinburgh, and in 1829 to Broughton Place Church in the same city. In 1834 he was appointed professor of pastoral and exegetical theology in connection with the associate synod. In 1847 he passed with his congre-

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gation over into the United Presbyterian Church. He died in Edinburgh, October 13, 1858. As a preacher, Dr. Brown was among the first of his time. For clearness of scriptural exposition, chaste and powerful language, and majestic ardor and earnestness of manner, he had no equal in his denomination and no superior in Scotland. The attractiveness of his delivery was heightened by a countenance singularly noble, tender, and sweet. Among his works are *The Law of Christ Respecting Civil Doctrine* (1839); *The Resurrection of Life* (1852); and his important and scholarly *Expository Discourses on the Epistle of First Peter* (3 vols., 1848); *Discourses and Sayings of Christ* (3 vols., 1850); on the *Epistle to the Galatians* (1853); on the *Epistle to the Romans* (1857); and that to the *Hebrews* (1862). For his life, consult Cairn's *Memoir* (Edinburgh, 1860).

BROWN, JOHN (1810-82). A Scottish physician and author. He was born at Biggar, Lanarkshire, Scotland, September 22, 1810; studied in the University of Edinburgh, and practiced medicine in that city. His practice was successful, but not large, and his fame rests mainly on his literary works, which consist of the sketches termed *Horæ Subsecivæ* (3 vols., 1858, 1861, 1882), and of the widely read *Rab and His Friends* (1859). His literary motto was that an author should not publish anything "unless he has something to say and has done his best to say it aright," and for this reason he published but little, distrusting his own powers and subjecting what he wrote to the severest criticism. But the little he did produce is marked by a winning tenderness and humor. He died May 11, 1882, after an uneventful and somewhat melancholy life. Consult Peddie, *Recollections of Dr. John Brown* (London, 1893).

BROWN, JOHN GEORGE (1831—). An American painter. He was born in Durham, England, November 11, 1831, and studied in Newcastle-on-Tyne and in Edinburgh, where he received a medal from the Royal Scottish Academy in the antique class in 1853. In the same year he took up his residence in America. He received medals from Boston and San Francisco in 1877 and the Paris Exposition in 1889. He was an original member of the Water Color Society (1866), and in 1901 was its president. He is also a member of the National Academy of Design and of the Artist's Fund Society. His portrayals of New York bootblacks and street urchins are widely known and very popular. Among his early works are: "Hiding in the Old Oak" (1874), and "Pull for the Shore" (1878). He was represented at the Paris Exposition of 1900 by "Street Boys at Play." Consult Clement and Hutton, *Artists of the Nineteenth Century* (Boston, 1884).

BROWN, JOHN LEWIS (1829-92). A French painter, born in Bordeaux. He was a pupil of Roqueplan and Belloc, and won fame by his pictures of hunting and military scenes, and his studies of horses and dogs. In method he is classed with the impressionists. His works include the following titles from a very extended list: "Steeple-Chase" (1861); "Interior of a Stable" (1861); "Horses on the Turf" (1861); "Hunting Incident" (1864); "At the Outposts" (1865); "Dogs Running" (1872); "Incident in the Battle of Fröschwiller" (1874); "Relay of Omnibus Horses" (1884); and "Hohenlinden" (1887).

BROWN, JOHN NEWTON (1803-68). A Baptist divine. He was born in New London, Conn., June 29, 1803, graduated at what is now Colgate University, Hamilton, N. Y., 1823; was pastor in various places, professor of theology and ecclesiastical history in the New Hampton Theological Institution, New Hampshire, 1838-45, editorial secretary of the American Baptist Publication Society, and editor of the *Christian Chronicle* and *National Baptist*, Philadelphia, from 1849 till his death in Germantown, Pa., May 15, 1868. He edited *The Encyclopædia of Religious Knowledge* (1835), and wrote *The New Hampshire Confession* (1852), which has been widely used.

BROWN, JOHN YOUNG (1835—). An American lawyer and politician. He was born in Hardin County, Ky., graduated at Centre College, Danville, in 1855, and was admitted to the bar in 1875. He was elected to Congress in 1859, but not having reached the minimum age prescribed by the Constitution for Congressmen, he was not allowed to take his seat until the second session. He was elected to Congress again in 1868, but was excluded by political disabilities. He sat in Congress during 1873-77, after which he devoted himself to his legal practice. He served as Governor of Kentucky from 1891 to 1895, and in 1897 ran for Governor as 'an honest election Democrat,' against Taylor and Goebel. He is widely known as an orator.

BROWN, JOSEPH EMERSON (1821-94). An American lawyer and politician. He was born in South Carolina, but early in life removed to Georgia. He graduated at the Yale Law School in 1846, and immediately engaged in the practice of his profession, but soon entered politics, and in 1849 was elected to the State Senate. He was chosen Governor by the Democrats in 1857, and by reëlection held that office until after the Civil War. He was an active secessionist, seizing the Georgia forts before the State left the Union and raising an army of 100,000 old men and boys to prevent General Sherman from passing through the State on the famous march to the sea. He, however, opposed President Davis's conscription measures, and in 1868 advised his State to accept the reconstruction policy. His party turned against him when he supported General Grant for the Presidency, and defeated him when he sought election to the United States Senate as a Republican. He was then appointed Chief Justice of the Supreme Court of Georgia, but resigned in 1870 to become president of the Western and Atlantic Railroad Company. In 1872 he returned to the Democratic Party, and in 1880 was elected to the United States Senate. He made large gifts for religious and educational purposes. Consult Fielder, *Life and Times of Joseph E. Brown* (Springfield, 1883).

BROWN, MR. The name signed to a series of letters to an imaginary young man about town, which Thackeray contributed to *Punch* in 1849.

BROWN, NICHOLAS (1769-1841). An American merchant and philanthropist, born in Providence, R. I. He graduated at Rhode Island College in 1786. Five years later he inherited his father's fortune and soon thereafter organized, with Thomas P. Inez, the business house which

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has since continued under the same firm name. He was one of the most generous patrons of the Rhode Island College, and in 1840 that institution took his name in recognition of his benefactions. His gifts to the college aggregated $100,000, and he also gave nearly $10,000 to the Providence Athenæum, and bequeathed $30,000 for an asylum for the insane at Providence. Consult: Hunt, *Lives of American Merchants*. (New York, 1856).

BROWN, Robert (1773-1858). An eminent Scottish botanist. He was born in Montrose, December 21, 1773, the son of an Episcopal clergyman, and was educated at Marischal College, Aberdeen. Having studied medicine at the University of Edinburgh, he became, in 1795, ensign and assistant surgeon in a Scottish fencible regiment, with which he went to Ireland. Devoting himself to the study of botany, he resigned his commissions in 1800, and the following year was, on the recommendation of Sir Joseph Banks, engaged as naturalist in the expedition sent out under Captain Flinders for the survey of the Australian coasts. On his return, in 1805, he brought home nearly 4000 species of Australian plants, a large proportion of which were new to science. Soon after he was appointed librarian to the Linnæan Society. To the *Transactions* of the Edinburgh Wernerian Society and those of the Linnæan Society, he contributed memoirs on *Asclepiadeæ and Proteaceæ*, and published *Prodromus Floræ Novæ Hollandiæ et Insulæ Van Diemen*, Vol. I. (1810); a supplement to this work appeared in 1830, relating to the *Proteaceæ* only. He also wrote the *General Remarks, Geographical and Systematical, on the Botany of Terra Australis* (1814), attached to the narrative of Captain Flinders's expedition. His adoption of the natural system of Jussieu, the French botanist, led to its general substitution in place of the Linnæan method. Brown's numerous memoirs in transactions of societies, and other contributions to botanical science, secured the universal approval of the title conferred on him by Alexander von Humboldt of *Botanicorum facile Princeps*. In 1810 Brown received the charge of the library and splendid collections of Sir Joseph Banks, which, in 1827, were transferred to the British Museum, when he was appointed keeper of the botanical department in that establishment. In 1811 he became a Fellow of the Royal Society, which in 1839 awarded him the Copley Medal for his *Discoveries During a Series of Years on the Subject of Vegetable Impregnation*. Oxford conferred on him the degree of D.C.L. in 1832; the Academy of Sciences of the French Institute elected him a foreign associate; and the King of Prussia decorated him. He was president of the Linnæan Society from 1849 to 1853, and died in London, June 10, 1858. His *Miscellaneous Botanical Works* (ed. Bennett) were published in 2 vols., 1866-68. See Brownian Movement.

BROWN, Robert (1842-95). A Scottish scientist and author. He was born in Campster, Caithness, and studied in Edinburgh, Leyden, Copenhagen, and Rostock. He visited Spitzbergen, Greenland, and the western shore of Baffin's Bay (1861), and subsequently carried on scientific investigations among the islands of the Pacific and on the Venezuelan, Alaskan, and Bering shores, making charts of all the unknown interior of Vancouver, and writing much on the fauna and flora of those countries. With E. Whymper, in 1867, he attempted to penetrate the inland ice of Greenland, and made many discoveries concerning its nature which have since been confirmed by Peary. He afterwards traveled in the Barbary States of North Africa, was a lecturer on geology, botany, and zoölogy in Edinburgh and Glasgow, and was a member of many learned societies in England, America, and on the Continent. He removed to London in 1876, and thereafter devoted himself entirely to literary work. In addition to many scientific memoirs, and articles and reviews in various languages, his publications include *Peoples of the World* (6 vols., 1882-85); *Science for All* (5 vols., 1877-82); and a *Manual of Botany* (1874).

BROWN, Sir Samuel (1776-1852). An English engineer. He was born in London, served with distinction in the British Navy, and became a retired captain in 1842. He is best known for his method of making iron chain cables, and as a designer and builder (1822) of the first iron suspension bridge in England, across the Tweed at Berwick. He also designed the chain pier at Brighton.

BROWN, Samuel Gilman (1813-85). An American educator. He was born in North Yarmouth, Maine, the son of President Francis Brown of Dartmouth College, graduated at Dartmouth in 1831 and at Andover Theological Seminary in 1831, was professor of oratory and belles-lettres in Dartmouth from 1839 to 1863, and held the chair of intellectual philosophy and political economy from 1863 to 1867. From 1867 to 1881 he was president of Hamilton College. Among his published works are *Biographies of Self-Taught Men* (1847) and an excellent and authoritative *Life of Rufus Choate* (2 vols., 1862).

BROWN, Samuel Robbins (1810-80). An American missionary to China. He was born in Connecticut, graduated at Yale in 1832, studied theology in Columbia, S. C., and taught for four years (1834-38) in the New York Institution for the Deaf and Dumb. In 1838 he went to Canton and opened, for the Morrison Education Society, the first Protestant school in the Chinese Empire—a school in which were taught Yung Wing and other pupils who afterwards came to the United States. After nine years' service, his wife's health failing, Dr. Brown returned to the United States and became a pastor and teacher of boys at Owasco Outlet, near Auburn (1851-59). He worked for the formation of a college for women, which was situated first in Auburn and then in Elmira, N. Y. When, by the Townsend Harris treaty of 1858, Yokohama and Nagasaki in Japan were opened to trade and residence, Dr. Brown sailed for the former port and opened a school in which hundreds of young men, afterwards leaders in various walks of life, were educated. He translated the New Testament, and taught and preached for twenty years. He was one of the founders of the Asiatic Society of Japan, and in many ways was one of the most prominent makers of the New Japan. He is buried at Monson, Mass., his boyhood's home. He has published: *Colloquial Japanese* (1863), a grammar, phrase-book, and vocabulary; *Prendergast's Mastery System Adapted to the Japanese;* translation of Arai Hakuseki's *Sei Yo Ki Bun: or, Annals of the Western*

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Ocean; A Maker of the New Orient (New York, 1902).

BROWN, SANGER (1852—). An American physician. He was born at Bloomfield (Ontario), Canada, graduated in 1880 at the Bellevue Hospital Medical College (New York City), was assistant physician at the Bloomingdale Asylum for the Insane (White Plains, N. Y.) in 1882-85, and acting medical superintendent there in 1886. In 1890 he was appointed professor of neurology in the Post-Graduate Medical School of Chicago, and later became associate professor of medicine and clinical medicine at the College of Physicians and Surgeons in the same city. In his experiments with E. A. Schäfer at University College, London, in 1886-87, he was the first to demonstrate conclusively that in monkeys the occipital lobe is the centre of vision.

BROWN, THOMAS (1663-1704). An English wit and miscellaneous writer, born at Shifnal, Shropshire. He studied at Christ Church, Oxford, was usher and afterwards head master of a school at Kensington-on-Thames, and for several years maintained himself in London by translating from Greek, Latin, Spanish, and French, and by composing those satirical pamphlets and poems which led Addison to refer to him as "of facetious memory." About 1691 he established the *Lacedæmonian Mercury*, early defunct. His *Satyr on the French King* got him into prison, whence he is said to have obtained his release by a plea couched in the form of a Pindaric ode. It must be confessed that considerable of his writing, such as the verses in which he apostrophizes Durfey as 'thou cur' and 'thou mongrel,' is but the sheerest fury of abuse. He is probably best known in connection with the story which relates that Dr. Fell, dean of Christ Church, had threatened him with expulsion; but, pacified by a supplicatory letter, agreed to let him off if he would make an extempore rendering of Martial's epigram. i. 32:

Non amo te, Sabidi, nec possum dicere quare:
Hoc tantum possum dicere, non amo te.

Brown is said to have responded forthwith:

I do not love thee, Doctor Fell,
The reason why I cannot tell;
But this I know, and know full well,
I do not love thee, Doctor Fell.

BROWN, THOMAS (1778-1820). A Scottish metaphysician, born at Kilmabreck, Kirkcudbrightshire. He went to Edinburgh in 1792, but without completing the course in arts he began the study of law, and shortly abandoned it for medicine. On completing his medical studies in 1803, he became (1806) the partner of Dr. Gregory in his large practice. But his strong bent was for literature and philosophical speculation. At the age of 20 he had published a refutation of Darwin's *Zoonomia*, and he contributed at the outset to the *Edinburgh Review*. In 1804 appeared his *Inquiry Into the Relation of Cause and Effect*, in which he holds that there is nothing in a cause but the fact of immediate and invariable antecedence to the change called its effect. Dugald Stewart, professor of moral philosophy in the university, being obliged, from bad health, to retire in 1810, got Brown appointed associate, and later as his successor, which office Brown continued to discharge till his death. He was popular as a professor, and his *Lectures on the Philosophy of the Human Mind* went through a great many editions. He also wrote some commonplace poetry. In some important respects Brown represented a reaction from the anti-human philosophy of Reid and Stewart in the direction of Hume's views, but without Hume's skepticism. Indeed, he claimed that Reid and Hume were not far apart, except in that the former emphasized the need of a faith in an external world the existence of which could not be proved. Brown followed Berkeley in making the consciousness of spatial externality a development out of temporal experience, and in general was true to the traditions of the Associationists, making much of 'suggestion.' He is credited with having differentiated for the first time the important class of muscular sensations. In his *Lectures on Ethics* (ed. by Dr. Chalmers, 1856), he derived the moral feeling from the social instincts.

BROWN, THOMAS EDWARD (1830-97). An English poet, born in the Isle of Man, the son of a Manx clergyman. After attending King William's College (1845-49), he was admitted to a servitorship at Christ Church, Oxford (1849). Though he was much humbled by his quasi-menial position, his university career was very brilliant. He obtained a double first class (1853) and a fellowship at Oriel (1854). After serving for a short time as vice-principal of King William's College, in his native island, and head master of the Crypt School, Gloucester, he became assistant master at Clifton College, Bristol, a post which he held for 30 years. In 1892 he resigned, and passed the rest of his life on the Isle of Man. He died October 29, 1897, at Clifton College, where he was on a visit. Brown's published poems comprise: *Betsy Lee* (1873); *Fo'c's'le Yarns, Including Betsy Lee* (1881); *The Doctor and Other Poems* (1887); *The Manx Witch and Other Poems* (1889); and *Old John and Other Poems* (1893). Outside of Brown's friends, these poems attracted little attention in England and none at all in the United States. But when they were collected in 1900 and published simultaneously with two volumes of letters, all the leading reviews took them up. Written mainly in the Anglo-Manx dialect, they possess great charm through odd and picturesque phrases. For example, a periphrasis for morning is "When the sun was jus' puttin' on his shoes." Though possessing marked lyrical qualities, they are mainly narrative, and thus have high significance after the long reign of the lyric. Indeed, *The Doctor* is a psychological novel in verse. The most carefully drawn character in the poems is Tom Baynes, a Manx sailor, who appears as narrator or actor. A like individuality pervades the strong and manly letters, descriptive of travels, scenery, and work, interspersed with fresh criticisms of many writers so opposite as Quarles and Flaubert. Consult *Collected Poems and Letters* (London and New York, 1900).

BROWN, THOMAS, THE YOUNGER. The nom de plume signed to Thomas Moore's *Intercepted Letters, or the Two-penny Post Bag.*

BROWN, Sir WILLIAM (1784-1864). An English merchant and philanthropist. He was born at Ballymena, Ireland, but in 1800 accompanied his parents to Baltimore, Md., where in a few years he became his father's partner in

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the linen business. In 1809 he established a branch of the business in Liverpool, and laid the foundation of one of the largest mercantile firms in the world—Brown, Shipley & Co. A Liberal Reformer, he took a prominent part in local and public affairs, and served in Parliament for four terms, beginning with the year 1846. He was an able advocate of free trade and the adoption of a decimal coinage. In 1857 he subscribed £40,000 for the establishment of a free public library in Liverpool, and the original library and museum buildings were erected by him.

BROWN, William Montgomery (1855—). An American Protestant Episcopal divine. He was born at Orrville, Wayne County, Ohio, and while in charge of Grace Church, Galion, Ohio, erected seven missions in that district. He became general missionary and Archdeacon of the diocese of Ohio in 1891, Bishop Coadjutor of Arkansas in 1898, and Bishop of Arkansas in 1899.

BROWN ALGÆ. See Algæ; and Phæophyceæ.

BROWN'-BAND'ED SNAKE. See Death-adder.

BROWN BEAR, THRUSH, etc. See Bear, Thrush, etc.

BROWN BESS. A term applied to the English flintlock in the latter part of the Eighteenth Century. The adjective probably arises from the brown color of the butt.

BROWN COAL. See Lignite.

BROWNE, Charles Farrar (1834-67). An American humorist, best known as 'Artemus Ward.' He was born at Waterford, Maine, April 26, 1834. He began life as a printer in the office of the *Skowhegan Clarion*, and at 15 was a compositor for a comic weekly journal in Boston, *The Carpet Bag*, to which he made occasional contributions. He then became reporter of the *Cleveland Plain Dealer*, and conceiving the idea of writing in the character of a showman, he began a series of *Artemus Ward's Sayings*, intentionally atrocious in spelling, but of humor that soon gained him notoriety. In 1860 he moved to New York, and joined the editorial staff of *Vanity Fair*. The first of his humorous lectures, "The Babes in the Wood," was delivered in Brooklyn, and proved so successful that he abandoned journalism for the platform. In 1862 he visited California and Utah, gathering materials for a series of comic lectures on the Mormons, "whose religion is singular but their wives are plural." These lectures, with a panoramic accompaniment, attained great popularity in America. Consumption attacked Browne in 1864, and for two years he withdrew from the public. In 1866, his health improving, he undertook a professional tour in England, where he lectured with very great success for three months, almost to the eve of his death, which occurred at Southampton, March 6, 1867. His lectures and humorous writings are collected as *Artemus Ward, His Book* (1865); *Artemus Ward, His Travels* (1865); *Artemus Ward in London* (1867). There is an edition of the *Works*, with a biographical sketch by Melville D. Landon (1875). Browne's extravagant humor has scarcely held its own with the public, but the genial character of the man and his pathetic fate keep his memory fresh.

BROWNE, Charles Francis (1859—). An American artist, born at Natick, Mass. He studied at the Boston Art Museum, in Philadelphia, and under Gérome in Paris. He is instructor and lecturer on the history of art in the Art Institute in Chicago, and has exhibited frequently here and abroad.

BROWNE, Edward Granville (1862—). An English Oriental scholar, born at Uley. He was educated at Pembroke College, Cambridge, studied medicine, but never practiced, and in 1887-88 traveled through Persia. In 1887 he became a fellow of Pembroke College, Cambridge, and in 1888 lecturer in Persian at the university. His publications include: *A Year Among the Persians* (1893); a catalogue of the Persian manuscripts contained in the university library at Cambridge (1893); a translation from the Persian, *A Traveler's Narrative, Written to Illustrate the Episode of the Báb*, with Persian text and notes (1891); *The New History of Mírzá Ali Muhammad the Báb* (1893); and numerous papers in the *Journal* of the Royal Asiatic Society.

BROWNE, Edward Harold (1811-91). An English bishop. He was educated at Cambridge, where he held various professorships until 1864, when he was consecrated Bishop of Ely. He was transferred to Winchester in 1873, but resigned, owing to ill health, in 1890. Among his writings are: *An Exposition of the Thirty-nine Articles* (2 vols., 1850-53), and *Sermons on the Atonement and Other Subjects* (1859).

BROWNE, Francis Fisher (1843—). An American editor, poet, and critic. He was born at South Halifax, Vt., December 1, 1843. After a high-school education Browne enlisted in the Forty-sixth Massachusetts Volunteers (1862-63); then studied law at Rochester and Ann Arbor; edited the *Lakeside Monthly*, Chicago (1869-74), *The Alliance* (1878-79), and *The Dial* (1880—), a semi-monthly literary review that has maintained a very high critical standard. He has written *Every-day Life of Abraham Lincoln* (1886) and *Volunteer Grain* (1896), and edited several anthologies, among which may be mentioned *Bugle Echoes* (1886), a collection of poems evoked by the Civil War.

BROWNE, George, Count de (1698-1792). An Irish soldier, born in Limerick. He was educated there, entered the military service of Russia in 1730, attained the rank of general, and was captured by the Turks. After his release, he fought with distinction in the Swedish War, with the rank of major-general, and during the Seven Years' War as lieutenant-general. At Kolin, and again at Zorndorf, he greatly aided in effecting a victory for the Allies. Under Peter III. he became a field-marshal, commander of the Russian forces in the Danish War, and Governor of the Province of Livonia.

BROWNE, Hablot Knight (1815-82). An English caricaturist and book illustrator, well known under the pseudonym of Phiz. He first came into prominence in 1835, when he succeeded Seymour as the illustrator of the *Pickwick Papers;* and subsequently he illustrated a number of the novels of Dickens, Lever, and Ainsworth, besides contributing to comic serials. Consult Thompson, *Life and Labors of H. K. Browne* (London, 1884).

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BROWNE, Isaac Hawkins (1705-60). An English poet. He was born at Burton-on-Trent, Stafford; was educated at Trinity College, Cambridge; and in 1744 and 1747 was elected as a Whig to the House of Commons, where, according to Dr. Johnson, he "never opened his mouth." His ode, *A Pipe of Tobacco*, was once popular; but he is now chiefly known for his Latin poem, *De Animi Immortalitate* (1754), an English translation of which, by Soame Jenyns, may be found in Vol. II. of the latter's works (1793). His contemporaries adjudged him a place among the wits of the day.

BROWNE, John Ross (1817-75). An American traveler and author. He was born in Ireland, but when a child emigrated with his parents to Kentucky. At the age of 18 he went down the Mississippi on a flatboat, and for some time was reporter of the Louisiana Senate. Next he shipped on a whaler, and upon his return published a book of observations on Zanzibar. He was for a time in the revenue service in California, where he reported the sessions of the first State Constitutional Convention. In 1851 he went as correspondent of a newspaper to Europe, visiting Italy, Sicily, and Palestine, and giving an account of his travels in *Yusef* (1853). He subsequently visited Algeria, Iceland, Poland, and Russia, and published *The Land of Thor* (1866) and *An American Family in Germany* (1867). In 1869 he made an elaborate report on the *Resources of the Pacific Slope*. He was Minister to China in 1868-69.

BROWNE, Junius Henri (1833-1902). An American journalist, well known as one of the correspondents of the New York *Tribune* during the Civil War. He was born at Seneca Falls, N. Y., was educated at Saint Xavier College, Cincinnati, Ohio, and for some time was engaged in journalism there. At the outbreak of the Civil War he was sent, as 'war correspondent' of the New York *Tribune*, to report the campaigns in the Southwest, but in May, 1863, was captured near Vicksburg by the Confederates, and for two years thereafter was confined successively in the Vicksburg, Jackson, Atlanta, Richmond, and Salisbury prisons. He escaped from Salisbury in December, 1864, with several companions; accomplished the difficult feat of crossing the mountains in midwinter; and after a journey of 400 miles reached the Federal lines at Knoxville. Soon afterwards he published a book of war experiences, entitled *Four Years in Secessia* (1865), which, though hastily prepared and somewhat crude in literary form, contains much interesting information concerning various incidents of the war, and especially concerning the conditions which obtained in Southern prisons, and the life of the Federal soldiers confined in them. After the war, and until his death, Browne was engaged as a 'general writer,' and contributed to many papers and periodicals in the United States. In addition to *Four Years in Secessia*, he published *The Great Metropolis: A Mirror of New York;* and *Lights and Sensations in Europe*.

BROWNE, Maximilian Ulysses, Count von (1705-57). An Austrian field-marshal, son of an expatriated Irish Jacobite. He was born in Basel, entered the Austrian service in 1717, and after fighting against the Turks (1737-39), served in Silesia. He commanded the right wing against Frederick the Great at the battle of Mollwitz (1741), where Frederick won his first victory in the Silesian War. During the Seven Years' War he was again defeated by Frederick at Lobositz (1756), and at Prague, where he was mortally wounded. Count von Browne was one of the most distinguished field-marshals in the army of Maria Theresa. Frederick the Great was wont to speak of him as his 'teacher in the art of war.'

BROWNE, Robert (c.1550-c.1633). An English clergyman, founder of the sect of Brownists, or Independents, and the earliest post-Reformations seceders from the Church of England. He was born at Tolethorpe, Rutlandshire, and educated at Cambridge. He then went to London, where he preached in the open air. Returning to Cambridge, he grew more radical in his views of Church organization, and preached where he pleased, without troubling to obtain the bishop's license. In 1580 he formed a separatist congregation at Norwich. Coming thus more than once into conflict with the law, he emigrated in 1581, with his friends, to Middleburg, in Zeeland, where he published several controversial books, including *A Treatise of Reformation Without Tarying for Anie*, and *A Booke which Sheweth the Life and Manners of All True Christians*. Browne's difficult temper, however, led to dissensions, and ultimately to the breaking up of the congregation. He went to Scotland in 1583, and assailed the established Presbyterian order there with his usual vigor; returned to England in 1584, was again imprisoned for several months, and in 1586 excommunicated. This spiritual penalty seems in some way to have affected him; certainly he ceased to preach nonconformity, and settled down to be master of Stamford Grammar School for five years, and rector of Achurch, Northamptonshire, from 1591 to the day of his death, which occurred, probably in 1633, in Northampton jail, his last imprisonment arising from his having struck a constable in a fit of passion. For the views adopted by those who followed his early teachings, see Brownists; Congregationalism; and consult Dexter, *Congregationalism of the Last Three Hundred Years* (New York, 1880), which contains a careful account of Browne's career.

BROWNE, Sir Thomas (1605-82). An English philosopher and miscellaneous author. He was born in London, studied at Winchester, graduated in 1626 at Broadgate Hall (now Pembroke College), Oxford, and traveled through France to Italy, where he attended lectures in the universities of Padua and Montpellier. Returning thence through Holland, he was made doctor of medicine by the University of Leyden in 1633. He set up as practitioner at Norwich in 1637, and soon attained to a very considerable professional repute. Though Royalist in sympathy, he pursued his researches in quiet indifference to the stirring events of the Civil War. His learning was both multiform and extensive. He spoke six languages, knew thoroughly philosophies ancient and modern, and was versed in astronomy, ornithology, and botany, as those sciences then existed. In general literature he was obviously well read, his quotation from the *Inferno*, for example, showing him to have been of the few who were then familiar with Dante. Of the four works published during his lifetime, the

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most famous and best are the *Religio Medici* (first authorized and correct ed., 1643), and the *Hydrotaphia, or Urn-Burial* (1658). The former was translated into Latin by John Merryweather (1644), and in one year passed through two Leyden and two Paris editions. It was subsequently rendered into French, German, and Dutch. Alike in England and on the Continent it aroused much controversy as to its orthodoxy, and was assailed and defended with an equal vehemence. The latter discusses the burial usages of various times and places, and closes with a chapter which for lofty and sustained eloquence must stand almost unequaled in English literature. The *Pseudodoxia Epidemica, or Enquiries into . . . Vulgar and Common Errors* (1646), is a mixture of cleverness and credulity, science and superstition, quite worthy of Pliny the Elder. The *Garden of Cyrus* (1658) contains some entertaining fantasies. A style more individual than Browne's was never written. Latin in derivation, it coins with an ease permitted only while language is yet plastic, and its periods move with a majestic solemnity. Respecting his thought, Dr. Johnson says: "He was always starting into collateral considerations; but the spirit and vigor of his pursuit always give delight; and the reader follows him, without reluctance, through his mazes, in themselves flowery and pleasing, and ending at the point originally in view." And Charles Lamb, who owed much of his own diction and viewpoint to Browne, has an acute phrase when he speaks of Sir Thomas's 'beautiful obliquities.' The best edition of Browne's works is that by Simon Wilkin (4 vols., London, 1835-36), which includes all the posthumous publications, together with correspondence and other new matter. The reprint of 1852 (London, 3 vols.) is abridged and otherwise inferior. There is also an edition (1881) by Dr. Greenhill of the *Religio Medici*. Consult further the fine essay on Browne in Pater, *Appreciations* (London, 1889).

BROWNE, WILLIAM (1591-1643). An English poet. Little is known of his life, except that he was in Exeter College, Oxford, and was a tutor to Robert Dormer, afterwards Earl of Carnarvon. He was of the school of Spenser, and author of *Britannia's Pastorals* (1613) and *The Shepherd's Pipe* (1614). Consult the complete edition of his *Works*, edited by Hazlitt (London, 1868).

BROWNELL, broun'*el or* brou-nĕl', HENRY HOWARD (1820-72). An American poet and historian, born in Providence, R. I., February 6, 1820. He was graduated from Trinity College, Hartford, in 1841, studied law, and was admitted to the bar, but settled as a teacher in Hartford. He published in 1847 a volume of *Poems*, and in 1851 the *People's Book of Ancient and Modern History*, and followed this in 1863 with *The Discoverers, Pioneers, and Settlers of North and South America*. But Brownell first attracted general attention by poems written during the Civil War. The earliest of these was a stirring version of the "General Orders" given by Admiral Farragut at the attack on the defenses of New Orleans. This led to his becoming attached to Admiral Farragut as private secretary. He was present at the naval battle in Mobile Bay, and after the war accompanied the Admiral on his European cruise. His best poems, "The River Fight" and "The Bay Fight," deal with the naval actions at New Orleans and Mobile. "They are to all the drawing-room battle poems as the torn flags of our victorious armadas to the stately ensigns that dressed their ships in the harbor" (O. W. Holmes). He collected his war poems in *Lyrics of a Day; or, Newspaper Poetry by a Volunteer in the United States Service* (1864). A selection of his *Poems*, revised by himself, appeared in 1866. His was the most popular battle poetry produced in the North during the Civil War; but his work is unfinished, uneven, often undignified, and sometimes grotesque. At its best, however, it sounds the lyric cry of a great national emotion. There is an appreciative essay on Brownell, by O. W. Holmes, entitled "Our Battle Laureate."

BROWNELL, WILLIAM CRARY (1851—). An American essayist and art critic, born in New York. He graduated at Amherst, and was for two years art critic of the *Nation* (New York). From 1890 he was a literary adviser of Charles Scribner's Sons. His published volumes are: *French Traits*, an essay in comparative criticism (1889); *French Art*, classic and contemporary painting and sculpture (1892); *Newport* (1896); and *Victorian Prose Masters* (1901). His treatment of French life was recognized as remarkably subtle and sympathetic, and of French art as very suggestive from a non-professional standpoint. His studies of the later English prose writers have been highly praised.

BROWN'HILLS'. A mining town in Staffordshire, England, about nine miles east of Wolverhampton (Map: England, E 4). It has iron-foundries and collieries. Population, in 1891, 11,820; in 1901, 15,252.

BROWN'IAN MOVEMENTS (discovered by the Scotch botanist, Dr. Robert Brown). The motion of very minute particles suspended in a fluid when seen through the microscope, often mistaken for motions of living matter. The cause of the movements has not been satisfactorily shown, but it has been surmised that heat is the motive power. Consult Carpenter, *The Microscope and Its Revelations*, eighth edition, edited by Dallinger (Philadelphia, 1901).

BROWN'IE (Scotch, from his supposed brown color). A good-natured and invisible goblin in the old popular superstitions of Scotland, who attached himself to farmhouses and other country dwellings, and while the inmates were asleep performed their labors, such as churning and threshing, for them. In Cornwall a similar brownie was evoked to assist at the swarming of bees. The resemblance to the Robin Goodfellow (q.v.) of the English and the Kobold of the Germans is conspicuous, and the Roman Lar is also suggested by this superstition.

BROWN'ING, ELIZABETH BARRETT (1806-61). An English poet. She was the eldest daughter of Edward Moulton, or Moulton-Barrett, as he afterwards wrote his name, and Mary Graham, and was born at Coxhoe Hall, five miles from the city of Durham, March 6, 1806. In 1809 the family settled in Herefordshire, among the Malvern Hills. Elizabeth early displayed great precocity, eagerly read books beyond the comprehension of most children, and when about eleven years old, composed an 'epic poem,' "The Battle of Marathon," an echo of Pope's *Iliad*.

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Taking up the study of the classics in the original, she read widely in Greek literature, nor was she less acquainted with that of her own country. In 1826 she published anonymously *An Essay on Mind and Other Poems*, giving evidence of unusual powers. In 1832 the family removed to Sidmouth, and three years later to London, where Miss Barrett established her reputation by *The Seraphim and Other Poems* (1838). The bursting of a blood-vessel in the lungs, added to the shock caused by the death, in 1840, of a favorite brother, endangered her life, and for seven years she was confined to her room; but even here she resumed her labors, and in 1844 published *Poems*, including "The Cry of the Children," and "Lady Geraldine's Courtship," in which she praised Robert Browning's verse. On May 20, 1845, she first met that distinguished poet, and on September 12, 1846, they were married against her father's wishes. Proceeding to Italy, they made Florence their home, and there in 1849 a son was born, Robert Wiedemann Barrett, now known as an artist and a poet. In 1850 appeared a collected edition of Mrs. Browning's poems, with revisions and omissions, containing also a new translation of the *Prometheus Bound*, and in 1856 *Aurora Leigh*, a romance, partly autobiographical, in blank verse. *Casa Guidi Windows* (1851) and *Poems Before Congress* (1860), were inspired by her ardent sympathy with the movement to free Italy. By this time her health had begun to fail, and on June 29, 1861, she passed peacefully away. In 1862 Mr. Browning published a volume of verses by his wife, *Last Poems;* in 1863 her *Greek Christian Poets and the English Poets*, essays and translations originally written for the *Athenæum*, and in 1866 *Selections From the Poems of Elizabeth Barrett Browning* (2d series, 1880). The married life of these brilliant poets was singularly happy, and their mutual influence is clearly seen in their verse. Mrs. Browning was slight in figure, had brilliant eyes, and an expressive face, was deeply spiritual, as all her writings show, fascinating in conversation, and erudite without being pedantic. Composing with great ease, she often employed false metres and fell into affectations, but it was well said of her that her diction was "at times sublime, and always musical and beautiful." The *Sonnets From the Portuguese*, so called, written after her engagement to Mr. Browning (privately printed in 1847 and included in the volume of 1850), are unrivaled, of their kind, in the English language. Consult: Ingram, *Elizabeth Barrett Browning* (Boston, 1888); Bayne, *Two Great Englishwomen* (London, 1881); *Letters of E. B. Browning*, edited by Kenyon (London and New York, 1897); *Letters of R. Browning and E. Barrett* (London and New York, 1899); and *Letters to R. H. Horne*, edited by Stoddard (New York, 1877).

BROWNING, Orville Hickman (1810-81). An American politician. He was born in Kentucky, but removed to Illinois, and helped Abraham Lincoln organize the Republican Party in that State. He served in both Houses of the State Legislature, was United States Senator (1861-63), Secretary of the Interior (1866-68), and acting Attorney-General of the United States (1868-69).

BROWNING, Oscar (1837—). An English author, born in London. He was educated at Eton and at King's College, Cambridge, graduating in 1860 with classical honors. From 1860 to 1875 he was a master at Eton, then returned to Cambridge, where he has since been lecturer in history and political science. As principal of the University Training College for teachers he has also performed valuable service. He was twice defeated as a Liberal candidate for Parliament. Of his numerous publications in history, biography, and education, may be cited: *The Netherlands in the Sixteenth Century* (1869); *Thirty Years' War* (1870); *Modern England* (1879); *History of Educational Theories* (1881); *History of England*, in 4 vols. (1890); *Life of George Eliot* (1890); *Goethe: Life and Works* (1891); *Life of Peter the Great* (1898); *Wars of the Nineteenth Century* (1899).

BROWNING, Robert (1812-1889). An English poet, distinguished for his original and subtle thought. He was born in Camberwell, a suburb of London, May 7, 1812. His father, Robert, was a clerk in the Bank of England, and his mother, Sarah Anne, the daughter of a Hamburg shipowner named Wiedemann, settled in Dundee. The father was a good classical scholar, a lover of old books, and a ready versifier. The mother, who had some musical talent, was of an exalted and lovely character. Both parents were Dissenters; and Browning never quite escaped from the consequences of his early religious training, although in one direction he permitted himself great breadth of speculation. Cardinal Wiseman, indeed, reviewing *Men and Women* in 1856, detected "beneath the surface an undercurrent of thought that is by no means inconsistent with out religion." The future poet had a happy childhood, encouraged by his father and mother in his refined tastes, and learning less from his school than from them and from the books they placed in his way. Among these was Pope's *Iliad*, which he read and liked at the age of eight. But his first master was really Byron, under whose influence he had written by 1824 enough poems to form a volume. Fortunately, this failed to find a publisher, for the next year the works of Shelley and Keats came into his hands, and, by revealing the possibilities of poetry, dissipated his youthful ideals and quickened his own development. After leaving school, Browning studied under a tutor, then attended a few lectures at University College, London, deciding to complete his education by travel on the Continent and a more intimate acquaintance with foreign literature. His sympathetic father had left him free to choose his life work, and although he was at this time known as an artist and musician rather than a writer, evidently he had long felt a stronger inclination in the direction of authorship; and an early desire to produce a series of monodramatic epics illustrating the life of typical souls now revived itself urgently. Early in January, 1833, he put forth anonymously his first book, *Pauline*, written the year before; a poem immature as a whole, but abounding in passages of great beauty. He spent the winter of 1833-34 in Russia. In 1835 he published a metaphysical drama, entitled *Paracelsus*, which was hailed by John Forster (q.v.) as a work of genius, and secured for Browning the friendship of Macready the actor, to whom he dedicated the historical drama *Strafford* (1837). From this time on until his marriage Browning lived mostly in London and

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its neighborhood, studying life, nature, and books, though in 1838 he visited Italy. In 1840 he published *Sordello*, the second of his series of dramatic monologues, whose inception dates back to 1834. The period 1841-46 was well filled by a series of poems published in eight numbers, bearing the collective title *Bells and Pomegranates*, and beginning with *Pippa Passes*, a lyrical drama showing the power of unconscious influence, which received warm praise from Miss Barrett, afterwards Mrs. Browning. This remarkable group embraced the plays *King Victor and King Charles* (1842); *The Return of the Druses* (1843); *Colombe's Birthday* (1844), successfully acted in 1853; the tragedy *A Blot in the 'Scutcheon* (1843), produced at Drury Lane that same year; *Dramatic Lyrics* (1842), among them "Cavalier Tunes" and "The Pied Piper of Hamelin"; *Dramatic Romances and Lyrics* (1845), including "How They Brought the Good News," "A Lost Leader," and "The Flight of the Duchess"; and closed with *A Soul's Tragedy* (1846), a work of tremendous power. In 1846 Browning was married to Elizabeth Barrett, and after that date resided in Italy, spending with his wife some months in England and Paris, 1851-52, and in Normandy, 1858, and returning to England to educate his son after Mrs. Browning's death in 1861. Before this sad termination of an ideal married life, Browning had published (1850) *Christmas Eve and Easter Day*, a poem defending catholicity in religion; and *Men and Women* (1855), including "Evelyn Hope," "Fra Lippo Lippi," and other now well-known lyrics. Then followed *Dramatis Personæ* (1864), containing "Gold Hair" and "Rabbi Ben Ezra"; *The Ring and the Book* (1868-69), an epic in 21,116 lines, dealing with the tyranny of the passions, and considered by many his masterpiece; *Balaustion's Adventure* (1871), including an English version of the *Alcestis* of Euripides; *Prince Hohenstiel Schwangau* (1871), a defense by the prince (Napoleon III.) of the doctrine of expediency; *Fifine at the Fair* (1872), a powerful discussion of a question in morals; *Red Cotton Night-Cap Country* (1873), the story of a famous Norman law case; *Aristophanes's Apology* (1875), including a transcript from Euripides; *The Inn Album* (1875), a tragic story of betrayal and suicide; *Pacchiarotto and Other Poems* (1876); *The Agamemnon of Æschylus* (1877); *La Saisiaz* and *The Two Poets of Croisic* (1878), the former asserting his belief in a future life; *Dramatic Idyls* (1879-80); *Jocoseria* (1883), a number of narrative poems; *Ferishtah's Fancies* (1884); *Parleyings with Certain People of Importance in Their Day* (1887), the characters serving as mouthpieces for the poet's opinions on literary, artistic, and philosophical questions; and *Asolando*, published in London on the day of Browning's death, which occurred in Venice, December 12, 1889. He was buried in Westminster Abbey.

Browning was below the medium height, inclining to stoutness, with a ruddy complexion, large and bright gray eyes, fine features, a quickness of speech and gait, and a magnetic address which together with his liberal sympathy with humanity enabled him to mingle freely with all classes. His love for Italy was as deep and intelligent as that of his wife, and from that 'land of lands' he drew the inspiration for many of his finest poems; though the fact that his grandfather was a German is recalled by his tendency to Hegelian philosophizing and by his questioning and speculative habit of mind, as well as by peculiarities of syntax and vocabulary.

What is called the obscurity of Browning's poetry is the characteristic that first strikes ordinary readers, and in many cases discourages them from further study. It may be admitted that he was often careless of artistic, and even of grammatical finish—that if it came to a choice, he valued substance above form; but the obscurity is often more apparent than real, and, where it exists, springs usually from the marvelous richness and fullness of his thought, and from the rapidity of his mental process, which passes from point to point more swiftly than the average mind can follow, careless, sometimes, of making the connection clear. The effort, however, which is necessary to apprehend him is not only a valuable mental tonic, but is frequently rewarded by the discovery of real and satisfying thought. The vast erudition of the poet, and his habit of casual allusion to things met with in out-of-the-way parts of his wide reading, also contribute to the impression of obscurity; but these difficulties are not sufficient to prevent his recognition as being, in his double capacity of poet and thinker, one of the most powerful influences on the spiritual and mental life of our age. It is possible that the choice of a vehicle of expression which was forced upon him by the time of his birth was in some degree an unfortunate one. Had he lived in the age of Shakespeare (next to whom he has been ranked for insight into the springs of human character and action), his genius, which was essentially dramatic, might more naturally and adequately have expressed itself in the form which characterized that period; or had he begun to write half a century later than he did, after the development of the psychological novel, he would very possibly have chosen to express in prose the vast range of thought on whose utterance the limitations of metrical law have sometimes imposed burdensome restrictions.

But such speculations are less important than the recognition of the qualities which he actually possessed, and which make him a vital force. Not least among them must be reckoned his unswerving optimism, at which Tennyson gravely shook his head, calling it 'depressing,' but which has been the inspiration of many another soul. He saw with the utmost clearness how eternally insoluble is 'the riddle of the painful earth'; he was the last who would have delighted fatuously in the arrangement of this as the best of all possible worlds; yet to the end he could describe himself, in the epilogue of his last published book, as

"One who never doubted clouds would break,
Never dreamed, though right were worsted, wrong would triumph;
Held, we fall to rise, are baffled to fight better,
Sleep to wake."

An inevitable comparison is suggested by the mention of Tennyson, whose name was generally, in their lifetime, coupled with Browning's. Their first books were published within three years, and the relations between them were always of the utmost cordiality and friendliness, untouched by any suspicion of the jealousy which might have affected smaller minds. The contrast in their style was happily defined in the aphorism of Oliver Wendell Holmes: "Tennyson is the

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light meat, Browning the dark." The laureate had a smoothness, a finish, and a grace which Browning rarely displays, though he showed at times that he could attain it; but from the cloying sweetness of Tennyson's Vergilian verses many will turn to the more manly and satisfying, if more rugged, tone of the robuster poet. The force of the first of these comparative epithets will be seen at once by recalling the attitude of the unsuccessful lovers in "Maud" and "Locksley Hall" on the one side and "The Last Ride Together" on the other.

If the Romantic movement be taken to stand for the assertion of the individual, his rights and his liberties, against the conventional order of the centuries, then Browning was essentially a Romantic. Strongly influenced as he was in his early years by Shelley, he preached a similar gospel of freedom from all restraints that hinder the growth of natural character. It was the 'life of typical souls' that he set himself to write; and always it is the typical soul that interests him—whether struggling to emerge from the confining bands of the mediæval system, or expanding amidst all the intricate complexities of modern life, which he loved precisely because it made the game harder to play, and thus more of an intellectual exercise. Indeed, though he chose his subjects frequently from the bygone centuries, partly won by their picturesque quality and partly obeying the fashion of his time, even in the mediæval period it was always the character which he sought to reproduce rather than, like Rossetti, the environment. Typical souls, whether good or evil in the world's estimation; men or women indifferently (and that he could read the one as unerringly as the other needs no further witness than the poignant truth of his analysis of a woman's heart in the poem "In a Year")—these were his subjects, and in the life of those souls, eminent moments, as Dowden puts it—"moments when life, caught up out of the ways of custom and low levels of prudence, takes its guidance and inspiration from a sudden discovery of truth through some high ardor of the heart." Browning as a poet may most fitly be classed with George Meredith as a novelist and Wagner as a composer. Alike decried as obscure and unintelligible, they have all come to be recognized by the thoughtful as supreme; and they are alike in their power to satisfy the deepest intellectual cravings with a fullness which is utterly beyond the power of their more popular rivals. The Browning Society, established in London in 1881 (four years after Professor Corson had founded the Cornell Browning Club), and the similar organizations throughout England and the United States, have by their discussions and publications done much to advance the study of his works.

BIBLIOGRAPHY. Only a few titles from the immense literature on Browning can be given here: *Browning Society Papers* (London, 1881-91); Berdoe, *Studies* (London, 1895); Symons, *Introduction to the Study of Browning* (London, 1886); Orr, *Handbook* (New York, 1892); Porter and Clark, *Browning Study Programmes* (New York, 1900); Cook, *Browning Guide-Book* (New York, 1891); Nettleship, *Robert Browning: Essays and Thoughts* (London, 1890); Fotheringham, *Studies* (London, 1898); Molineux, *Browning Phrase-Book* (Boston, 1896); Little, *Essays* (London, 1899); Orr, *Life and Letters* (New York, 1891); Sharp, *Life* (London, 1890); Gosse, *Personalia* (New York, 1890); Waugh, *Robert Browning* (London, 1900). See also BROWNING, ELIZABETH BARRETT.

BROWN'ISTS. A name current in England toward the end of the Sixteenth Century and applied indiscriminately to all seceders from the Established Church, among whom Robert Browne (q.v.) was especially prominent. His writings (1582-83) were widely read and did much to foster those principles upon which the Separatist churches of England and Holland and the later Independent and Congregational churches of England and America were founded, but the extreme independency he advocated, together with his illiberality, was so distasteful, and his return to the Church of England was regarded as such a disgraceful relapse, that, in general, the Separatists repudiated the appellation of 'Brownists' as inappropriate and slanderous.

BROWN, JONES, AND ROBINSON, THE ADVENTURES OF. A series of humorous sketches, with explanatory notes, by Richard Doyle (q.v.), the English caricaturist. Many of them appeared in the London *Punch;* but they were later completed for Bradbury and Evans, who published them in 1854. They deal with the mishaps of three middle-class citizens of London—one tall, one short, one fat—on their travels at home and abroad.

BROWN'LEE, WILLIAM CRAIG (1784-1860). An American clergyman. He was born in Torfoot, Lancashire, Scotland, and studied at the University of Glasgow. After holding several pastorates in Pennsylvania and New Jersey, he became professor of Latin and Greek at Rutgers College in 1825. In the following year he was installed as one of the ministers of the Collegiate Reformed Dutch Church in New York City. He edited the *Dutch Church Magazine* (4 vols.) and published a number of independent works, among which are: *The Christian Youth's Book; Christian Father at Home; History of the Western Apostolic Church;* and *The Whigs of Scotland,* a romance.

BROWN'LOW, WILLIAM GANNAWAY (1805-77). An American journalist, born in Wythe County, Va. He learned the trade of a carpenter, but in 1826 became a Methodist minister, and was for ten years an itinerant. He took an active part in politics and advocated the reëlection of Adams in 1828. In 1839 he was editor of the *Knoxville Whig,* and his bold and quaint utterances soon gave him a wide reputation, and gained him the nickname of 'the fighting parson.' Though a strong advocate of slavery, he vigorously opposed secession on the ground that the South could best preserve her institutions by remaining in the Union. For this reason his paper was suppressed, and he himself was first arrested, and later sent into the Federal lines. He returned to Tennessee in 1864, was elected Governor in 1865, and in 1869 was sent to the United States Senate, where he remained until 1875. He had sold the *Whig* in 1869, but bought a controlling interest in it again in 1875. He published *The Iron Wheel Examined* (1856), a reply to attacks on the Methodist Church, and *Sketches of the Rise, Progress, and Decline of Secession, with a Narrative of Personal Adventures Among the Rebels* (1862).

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BROWNLOW, Mr. The benevolent protector of Oliver Twist in Dickens's novel of that name. He first meets his future charge at a bookstall, where Oliver's companions pick his pockets. He is left at the conclusion of the tale 'filling the mind of his adopted son, from day to day, with stores of knowledge.'

BROWN'RIGG PAPERS. The title of a series of sketches by Douglas Jerrold (1860).

BROWN-SÉQUARD, -sā'kär', Charles Edouard (1818-94). A French-American neurologist and physiologist, born in Mauritius. His father, Edward Brown, was a native of Philadelphia; his mother was French, of the name of Séquard. He took the degree of M.D. in Paris, 1840, and afterwards spent much of his time in America, investigating and lecturing. His contributions to our knowledge of blood and animal heat, as well as of the spinal cord and the nervous system, were of the highest importance. He was the first to demonstrate that the decussation of the sensory conductors is in the cord itself, and he has the reputation of having created the physiology of the sensory tract of the spinal cord. From 1864 to 1868 Dr. Brown-Séquard was professor of physiology and pathology of the nervous system in Harvard University. Returning to France in 1869, he was appointed professor of experimental and comparative physiology in Paris. He was founder and editor of the *Journal de la Physiologie de l'Homme et des Animaux* from 1858 to 1863. He established *Archives de la Physiologie Normale et Pathologique* in 1869. From 1873 to 1878 he practiced medicine in New York, and with Dr. E. C. Seguin published the *Archives of Scientific and Practical Medicine.* In 1878 he succeeded Claude Bernard as professor of experimental medicine at the Collège de France. He published *Lectures on the Diagnosis and Treatment of the Principal Forms of Paralysis of the Lower Extremities* (1861). In 1889, at the age of 71, after a series of experiments upon himself, and unfortunately for his reputation, he advocated as a means of prolonging and invigorating human life the hypodermic injection of a fluid in which the testicles of sheep had been macerated—the 'Brown-Séquard Elixir.'

BROWN'SON, Orestes Augustus (1803-76). An American theologian and author. He was born in Stockbridge, Vt., and was brought up as a Presbyterian, but became a Universalist preacher, and was a vigorous and indefatigable writer in support of whatever belief he for the time adopted. In 1828 he went into politics, and tried to establish a Workingmen's Party in New York, moved thereto by the ideas of Robert Owen. In 1832 he was enthusiastic over Dr. Channing, and became a Unitarian preacher. In 1836 he organized in Boston "The Society of Christian Progress" as a church, of which he was pastor. At this period, also, Brownson was one of the New England Transcendentalists, and published *New Views of Christianity, Society, and the Church,* which was a moderate attack on Protestantism. In 1838 he started the *Boston Quarterly Review,* which had existence for about five years, and was then merged in the New York *Democratic Review,* and from 1844 was known as *Brownson's Quarterly Review.* This was written throughout almost entirely by Brownson himself. In 1840 he published *Charles Elwood: or, The Infidel Converted,* a treatise, in the form of a story, in favor of the Roman Catholic Church, toward which the author was drifting, and which he joined in 1844. A deeply spiritual man, he gained a reputation as a philosopher and a powerful Catholic apologist, in spite of his frequent conflicts with the Church authorities. His most important writings, in addition to those mentioned above, are: *The Convert: or Leaves from My Experience* (1857); *The American Republic: Its Constitution, Tendencies, and Destiny* (1870). His *Works* have been republished by his son, H. F. Brownson, in 20 volumes (1882-87). The latter has also published a *Life,* in 3 vols. (1898-1900).

BROWN SPAR. A name popularly given to certain varieties of mineral carbonates that are colored brown, on account of the presence of iron oxide, especially *ankerite, dolomite, magnesite,* and *siderite.*

BROWNSTONE. A variety of sandstone, of reddish-brown color, used extensively as a building material. The brownstones of Connecticut and New Jersey, which belong to the Triassic system, are heavily bedded, impure sandstones, rather soft when first removed from the quarries, but hardening with exposure to the air. They were much employed at one time in New York and other Eastern cities, but in recent years they have been superseded in public favor by granite and limestone. See Building-Stone.

BROWN'S TRACT. A tract of land containing about 200,000 acres, situated in the Adirondack Mountain region, in northern New York, extending across Herkimer County into Hamilton County on the east, and into Lewis County on the west. It was purchased by John Brown, a patron of Brown University, from Alexander McComb. The tract is magnificently wooded.

BROWNS'VILLE. A city and county-seat of Haywood County, Tenn., 57 miles northeast of Memphis, on the Louisville and Nashville Railroad (Map: Tennessee, B 5). It is a fertile region, adapted to stock-raising and fruit-growing, as well as to the cultivation of cotton, which forms the staple of its trade and manufactures. Brownsville is the seat of Wesleyan Female College (Methodist Episcopal, South), founded in 1870, and Brownsville Female College (Baptist), established in 1851. Population, in 1890, 2516; in 1900, 2645.

BROWNSVILLE. A city, port of entry, and county-seat of Cameron County, Tex., opposite Matamoras, Mexico, on the Rio Grande River and on the Rio Grande Railroad (Map: Texas, F 6). It has important commercial and stock-raising interests, and a large trade with Mexico. Its notable buildings include the Cameron County court-house, a United States custom-house, a Roman Catholic convent, and the Roman Catholic cathedral. Settled in 1848, Brownsville was incorporated in 1853, and is now governed under the charter of 1875, which provides for a mayor, elected biennially, and a city council. Brownsville is in the territory claimed after 1845 by both the United States and Mexico. On May 9, 1846, the battle of Resaca de la Palma (q.v.) was fought 4 miles away, and at Fort Brown (formerly Fort Taylor), near by, a garrison was stationed throughout the Mexican War. On September 28, 1859, Brownsville was captured

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by a Mexican raiding party under Cortina. Population, in 1890, 6134; in 1900, 6305.

BROWN SWISS CATTLE. A breed of dairy cattle, most highly developed in the Canton of Schwyz, Switzerland, and introduced into the United States in 1869. It is one of the two principal breeds in Switzerland, and is growing in numbers and favor elsewhere. See CATTLE, and Plate of DAIRY CATTLE.

BROWN UNIVERSITY (so named after Nicholas Brown, one of its most munificent patrons). One of the oldest institutions of learning in the United States, situated in Providence, R. I. The charter of the university was granted by the General Assembly of Rhode Island in 1764, and instruction was begun in Warren in 1765. The inception of the university was mainly due to discriminations made against Baptist students in existing American colleges, and to the consequent desire of the Baptists for a college under their own control. Under the initiative of the Philadelphia Baptist Association, Rhode Island was chosen as the home of the new college, since that Colony was Baptist 'in origin and popular attachment,' and also recognized 'absolute religious liberty.' The charter of the university provided for a corporation of 12 fellows and 36 trustees; 8 of the fellows, including the president, to be Baptists, and the other 4 of any denomination, and 22 of the trustees to be Baptists, an dthe remaining 14 of other specified Protestant denominations. At the same time the charter enacted that into the 'liberal and catholic institution' so created 'religious tests' should 'never be admitted,' but that, on the contrary, all the members thereof should 'enjoy full, free, absolute, and uninterrupted liberty of conscience.'

The first president of the college was the Rev. James Manning, a Princeton graduate. He established a Latin school in Warren, preparatory to the beginning of collegiate instruction, and this school was removed, together with the college, to Providence in 1770, and has since existed there as the University Grammar School. In the spring of 1770 the foundations of the first permanent college building, the present University Hall, were laid on the crest of a hill overlooking the town and surrounding country of Providence. In 1804 the name of the college was changed from Rhode Island College to Brown University in honor of Nicholas Brown, of the class of 1786, whose gifts to the college amounted to not less than $160,000. The growth of the university was gradual until the election of its fourth president, the Rev. Francis Wayland, in 1827. In the twent-eight years of his administration President Wayland brought about an entire reorganization and a great expansion in the scope of the work of the university. The elective principle was recognized; sciences were introduced and made prominent in the curriculum; the permanent funds were largely augmented, and the influence and intellectual prestige of the institution were raised. But the work which President Wayland had begun was not vigorously prosecuted after his resignation, and it was not until the accession to the presidency in 1889 of the Rev. Elisha Benjamin Andrews, a graduate of the class of 1870, that the modern life of the university, properly speaking, began. During his term of office the number of undergraduate students increased from 268 to 864, and of graduate students from 3 to 101; all scholastic departments, and especially those in the humanities, were much enlarged, and in October, 1891, the Women's College was founded. At first, only the privilege of university examinations was granted, but in 1892 all the university degrees, and also the graduate courses, were opened to women, and in 1897 the institution was formally accepted by the corporation as the Women's College in Brown University, and its management vested in a dean, subject to the direction of the president of the university.

Brown University offers courses leading to the degrees of A.B., Ph.B., B.S., C.E., M.E., A.M., and Ph.D. Candidates for the degrees of A.B. and Ph.B. are offered a large range of electives after the freshman year. For the more technical degree of B.S. less freedom of election is given, while for the degrees M.E. and C.E. no option is given. Of recent years Brown has placed much emphasis upon post-graduate work. The income of about 100 scholarships is available for needy students; in addition there is a considerable aid loan fund.

The libraries number 110,000 volumes, besides 30,000 pamphlets. These include various departmental libraries, of which the most important are the Harkness Classical Seminary Library, the Romance Seminary Library, and the Conant German Seminary Library of 6000 volumes. In the main library is the Harris Collection of American Poetry, numbering 5000 volumes. The equipment of the university includes the Jenks Museum of Zoölogy, the Museum of Anthropology, the Olney Herbarium, the Museum of Classical Archæology, and the Ladd Astronomical Observatory, furnished with a 12-inch equatorial and other minor apparatus. The Physical Laboratory occupies a costly separate building, and the Anatomical, Chemical, Botanical, Psychological, and Engineering departments all have important libraries.

In 1901 the endowments of the university amounted to $1,657,000. At the same time there were 89 professors and instructors and a student body of 872, of whom 94 were graduate students, 624 undergraduates, and 154 students in the Women's College.

The presidents have been: James Manning, 1765-91; Jonathan Maxcy, 1792-1802; Asa Messer, 1802-26; Francis Wayland, 1827-55; Barnas Sears, 1855-67; Alexis Caswell, 1868-72; Ezekiel G. Robinson, 1872-89; Elisha B. Andrews, 1889-98; Rev. William Herbert Perry Faunce, A.M., D.D., 1899—. Consult: *Brown University, Annual Reports of President* (Providence, 1869, et seq.); Executive Board, *Sketch of the History and Present Organization of Brown University* (Providence, 1861).

BROWN'WOOD. A city and county-seat of Brown County, Texas, 140 miles southwest of Dallas; on Pecan Bayou, and on the Fort Worth and Rio Grande and the Gulf, Colorado and Santa Fé railroads (Map: Texas, E 4). It is the seat of Howard Payne College (Baptist) and Daniel Baker College (Presbyterian), and has fine public, business, and church buildings. The city has considerable trade in cotton, wheat, pecan nuts, and hides, and its industrial interests are represented by cotton-gins, cottonseed-oil mills, flour-mills, machine-shops, etc. There are

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deposits of oil in the vicinity. Settled in 1866, Brownwood was incorporated in 1878. The government is administered under a charter of 1891, which provides for a mayor, elected biennially, and a city council. The water-works are owned and operated by the municipality. Population, in 1890, 2176; in 1900, 3965.

BROŽIK, brō'zhĕk, VACZLAV (1851-1901). A Bohemian painter, born in Tremoschna, Bohemia. He was a pupil of the Prague Academy, and of Piloty in Munich, and in 1878 exhibited "Embassy of Ladislas of Bohemia to Charles VII. of France." The subjects of most of his works are derived from the history of Bohemia, including "The Ballad Singer," "The Execution on the White Mountain," and "The Imperial Councilors Thrown Out of the Window at Prague," often ranked as his best. In the Metropolitan Museum, New York, there is a large picture by him of "Columbus at the Court of Ferdinand and Isabella."

BRUANG, brōō-äng'. See SUN-BEAR, under BEAR.

BRUCE. A family illustrious in Scottish history, descended from Robert de Bruis, a Norman knight, who accompanied William the Conqueror to England in 1066, and died about 1094. His son, Robert, was a companion in arms of Prince David of Scotland, afterwards David I., from whom he received a grant of the lordship of Annandale, held by military tenure. At the commencement of the war in England between Stephen of Blois and Matilda, niece of the King of Scots, Robert de Bruis adhered to the former, and renounced his allegiance to David, resigning his lands in Annandale to his son Robert. In 1138 he was sent by the barons of the north of England to negotiate with David, who had advanced in support of his niece's claims as far as Northallerton, Yorkshire. In the battle of the Standard which followed, according to tradition, he took prisoner his son Robert, then fourteen years of age, who, as Lord of Annandale, fought on the Scottish side. He died in 1141. His English estates were inherited by his eldest son, Adam, whose male line terminated in Peter de Bruis, Constable of Scarborough, in 1271. Robert de Bruis, second Lord of Annandale, had two sons: Robert, who married a natural daughter of William the Lion, and died without issue, before 1191; and William, whose son, Robert, fourth Lord of Annandale, married Isabel, second daughter of David, Earl of Huntington, brother of William the Lion, and thus laid the foundation of the royal House of Bruce. He died in 1245.

BRUCE, ALEXANDER BALMAIN (1831-99). A Scottish divine and author, born at Aberargie, in Perthshire. He was educated at the University of Edinburgh and at the divinity hall of the Free Church of Scotland. In 1859 he was called to Cardross, in Dumbartonshire, and in 1868 to the Free Church of Broughty Ferry, in Forfarshire. In 1875 he was appointed professor of apologetics and New Testament exegesis in the Free Church Hall in Glasgow, a position which he filled with distinction till his death. In 1886 he was the Ely lecturer at Union Theological Seminary, New York, and in 1896-97 was the Gifford lecturer at the University of Glasgow. Bruce was among the most distinguished biblical scholars of his time. His reputation was gained by his studies on the Gospels, entitled *The Training of the Twelve* (1871). On account of his views concerning inspiration contained in *The Kingdom of God; or, Christ's Teachings According to the Synoptic Gospels* (1889), he was severely criticised by the orthodox and received a slight censure from the General Assembly. Among his other books are: *The Humiliation of Christ* (Cunningham Lectures, 1876); *The Chief End of Revelation* (1881); *The Parabolic Teaching of Christ* (1882); *The Galilean Gospel* (1884); *The Miraculous Element in the Gospels* (1886); *Apologetics; or, the Cause of Christianity Defensively Stated* (1892); *With Open Face* (1896); *The Providential Order of the World* (1897); and *The Moral Order of the World* (1899). Under his superintendence were issued *The Free Church Hymn Book* (1882) and the *Church Hymnary* (1898). In conjunction with Canon T. K. Cheyne, he edited the *Theological Translation Library* (1894).

BRUCE, BLANCHE K. (1841-98). A colored politician of some note. He was born in slavery in Prince Edward County, Va., but was educated with his master's son. He subsequently taught a school for negroes in Missouri, and was able to take a partial course at Oberlin College. He then became a planter in Mississippi in 1869, entered heartily into the Reconstruction movement, and held several local offices, including that of county superintendent of education. Early in 1875 he was elected to the United States Senate as a Republican, and served one term, being the first negro to serve in this body. In 1881 President Garfield appointed him Register of the United States Treasury, a position which he held until 1885. President McKinley appointed him to the same office in 1897.

BRUCE, DAVID (1324-71). A king of Scotland, son of King Robert Bruce, whom he succeeded, in 1329, as David II. In accordance with the terms of the treaty of Northampton, he had married, when four years old, Joanna, daughter of Edward II. of England, and on November 23, 1331, he was crowned with her at Scone. In 1332 the success of Edward Baliol (q.v.) and the English party obliged David's guardians to send him and his consort to France; but on the dispersion of Baliol's adherents David returned to Scotland, in 1341. He made unsuccessful inroads into England, and in 1346 was taken prisoner at the battle of Neville's Cross, near Durham, and conveyed to the Tower of London. Thence he was removed to Oldham, in Hampshire, and not released till 1357, when his ransom was fixed at 100,000 marks. His Queen died in 1362, and he married Margaret Logie, a Scottish gentlewoman of singular beauty, whom he divorced in 1369. He had no issue, and in his later years he was engaged in several intrigues with England, with the view of excluding his nephew, Robert, the Steward of Scotland and the next heir, from the throne. He died at Edinburgh Castle February 22, 1371.

BRUCE, DAVID (1855—). An English army surgeon and scientific writer, born in Melbourne, Australia. He was educated at Edinburgh University, became a surgeon in the Royal Army Medical Corps in 1883, and from 1884 to 1889 saw service in Malta and Egypt. In 1889-94 he was professor of pathology at the Army Medical School, Netley, Hampshire; from 1894 served

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in South Africa, and in 1901 was assigned to the home district. He was promoted to be surgeon-major in 1895, and lieutenant-colonel in 1900. His publications include several important articles regarding Malta fever, on which he is an authority, contributed to *The Practitioner* (1887-88); to the *British Medical Journal* (1889); the Army Medical Service *Blue Book* (1890); Quain's *Dictionary of Medicine*, and Davidson's *Diseases of Warm Climates*. He was chosen a fellow of the Royal Society of Great Britain.

BRUCE, Edward (? -1318). A king of Ireland, younger brother of Robert Bruce. He was a chivalrous but rash and impetuous prince, and was actively engaged in the struggle for Scotland's independence. In 1308 he made himself master of Galloway. In 1315 the chieftains of Ulster tendered him the crown of Ireland, on condition that he should assist them to expel the English from the island. With an army of about 6000 men he landed in Ulster in May of that year, and his rapid victories soon made him master of the Province of Ulster. He was crowned King of Ireland, but was slain at the battle of Dundalk, in 1318.

BRUCE, Sir Frederick William Adolphus (1814-67). A British diplomatist. He was born in Broomhall, Fifeshire, and was the son of the seventh Earl of Elgin. He was sent as Consul-General to Egypt in 1849, and was appointed Minister to China in 1861. In 1864 he acted as umpire in the controversy between the United States and the Republic of Colombia, and in the following year succeeded Lord Lyons as Ambassador to the United States. His discretion and tact were important factors in preserving peace at that time between the two governments.

BRUCE, Sir George Barclay (1821—). An English engineer, born in Newcastle-on-Tyne. He was educated as a civil engineer by Robert Stephenson, was employed on various railways, and in 1850 completed his work as resident engineer upon the Royal Border Bridge, by which the Newcastle and Berwick Railway crossed the river Tweed at Berwick. In 1853 he was appointed chief engineer of the Madras Railway (India), and subsequently consulting engineer of the South Indian Railway. He was also engineer of numerous lines in Europe, South America, and New Zealand. In 1887-88 he was president of the Institute of Civil Engineers.

BRUCE, James (1730-94). A Scottish traveler. He was born in Kinnaird, Stirlingshire, and educated in Harrow and the University of Edinburgh. He did not enter the legal profession, as he had purposed, but was for a time (1754-61) a wine merchant. In 1762 he was appointed British agent and Consul-General at Algiers, but in 1765 resigned this post to study and sketch the ancient ruins in Barbary. He undertook in 1768 a journey of exploration through Abyssinia; in 1770 rediscovered the source of the Blue Nile, and after great hardships arrived in November, 1772, at Assuan, Egypt. His massive *Travels to Discover the Source of the Nile* (5 vols., 1790) is a most interesting, and in the main a truthful, narrative, notwithstanding the fact that it suffers as regards accuracy in many details from having been begun as late as 1785, and then prepared without reference to his journals. His veracity, attacked by some contemporaries, has in general been established. He spoke and read with ease French, Italian, Arabic, Ethiopic, and Amharic, and was acquainted with Greek, Latin, Hebrew, Chaldee, and Syriac; but he lacked critical scholarship. The *Travels* was translated into French (1790) by Castera, and into German (1790) by Volkmann. Consult Murray, *The Life and Writings of James Bruce* (Edinburgh and London, 1808).

BRUCE, Michael (1746-67). A minor Scottish poet. He was born in Kinnesswood, Kinross-shire, the son of a weaver, and in his earlier years was employed as a herd-boy. In 1762 he was sent to Edinburgh University to study for the ministry, and when not at college was employed as a village schoolmaster. His poems, few in number but of a singular tenderness and pathos, were published in Edinburgh in 1770 by the Rev. John Logan, his fellow student and associate at college, who is accused by perhaps the majority of literary critics of having appropriated many of Bruce's poems, among them the *Ode of the Cuckoo*. Consult *Bruce's Works*, edited by Grosart (Edinburgh, 1865), with memoir and notes.

BRUCE, Robert (1210-95). The fifth Lord of Annandale, and competitor with John Baliol for the crown of Scotland. On the death of his mother, the Princess Isabel, in 1251, he did homage to Henry III. for her lands in England, and in 1255 was made Sheriff of Cumberland and Governor of Carlisle. The same year he was appointed one of the fifteen regents of Scotland, during the minority of Alexander III. In 1264 he led, with Comyn and Baliol, the Scottish auxiliaries to the assistance of the English monarch at the battle of Lewes, where he was taken prisoner, but was released after the battle of Evesham the following year. In 1290, when the Scottish throne became vacant by the death of Margaret, the 'Maiden of Norway,' granddaughter of Alexander III., Baliol and Bruce claimed the succession, the former as great-grandson of David, Earl of Huntingdon, by his eldest daughter, Margaret; the latter as grandson, by his second daughter, Isabel. Edward I. of England, to whom the dispute was referred, decided in favor of Baliol, November 17, 1292. To avoid swearing fealty to his successful rival, Bruce resigned Annandale to his eldest son, Robert de Bruce, Earl of Carrick. He died at his castle of Lochmaben, Dumfriesshire, in 1295, leaving three sons and a daughter.

BRUCE, Robert (1274-1329). Liberator of Scotland, and King of that country from 1306 to 1329. He was the grandson of Robert Bruce, the competitor of Edward Baliol for the throne in 1290, and was born July 11, 1274. In the early part of his career he seems to have been guided entirely by selfish interests, and to have played fast and loose with both English and Scotch. At first he favored the English interests, in the expectation, doubtless, of his father being raised to the Scottish throne, and in 1296, as Earl of Carrick, he swore fealty to Edward I. at Berwick, and the following year he is said to have renewed his oath of homage at Carlisle. Shortly after, he abandoned the cause of Edward, joined the Scottish leaders in arms for the independence of their country, made his peace with the English monarch by the capitulation of

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Irvine concluded July 9, 1297, and once more took the field against him. In 1299, the year after Wallace's defeat at Falkirk, Bruce, again in favor with Edward, was made one of the four regents who ruled the kingdom in the name of Baliol, but apparently took no part in active hostilities, yet in the three campaigns which took place previous to the final subjugation of Scotland, contrived to retain the friendship of Edward. In 1305 he was consulted in the settlement of the government. With John Comyn, called the 'Red Comyn,' the nephew of Baliol, he had long been at enmity. In an interview between them, in the church of the Minorite Friars at Dumfries, on February 10, 1306, a quarrel took place, and Bruce stabbed Comyn with his dagger. Rushing out to his attendants, he exclaimed, it is said: "I doubt I have slain the Red Comyn!" "You doubt!" cried one of them; "I mak sikker!" (i.e. sure), and, running into the church with some others, slew Comyn and his brother. Bruce hastened to Lochmaben Castle, assembled his vassals, and proclaimed his right to the throne. On March 27 he was crowned King at Scone. An English army, under the Earl of Pembroke, nominated by Edward Governor of Scotland, took possession of Perth, and on June 19 attacked Bruce in the wood of Methven, compelling him to retreat into the wilds of Athole. At Dalry, near the head of Loch Tay, Bruce was attacked by Alexander, Lord of Lorn, chief of the Macdougals, related by marriage to the Red Comyn, and compelled to retire. Sending his Queen and her ladies to Kildrummy Castle, Bruce fled to the highlands, and thence to the little island of Rachrine, on the coast of Antrim, Ireland. In his absence the English took the Queen and the Princess Marjory from the sanctuary of Saint Duthac, Ross-shire. Many of Bruce's followers were beheaded or hanged, all his estates were confiscated, and he and his adherents were excommunicated by the Pope's legate at Carlisle. Persecution, however, brought many adherents to Bruce. In the spring of 1307, with about 300 men, Bruce landed in Carrick, and at midnight surprised the English garrison in his own castle of Turnberry, but retired before a superior force into the mountainous districts of Ayrshire. At Loudon Hill, May 10, 1307, he defeated the English under the Earl of Pembroke, and three days after overthrew another army under the Earl of Gloucester. In less than two years he wrested from the English nearly the whole of Scotland. Edward I. was dead, and Edward II. was without the ability to hold his father's conquests. In the fall of 1312 the Scots invaded England, but with little success. In the autumn of 1313 Edward Bruce, brother of Robert, undertook the siege of Stirling Castle, held by Sir Philip Mowbray for the English. A treaty was entered into by which Mowbray bound himself to surrender the fortress if not relieved before the 24th of June in the following year. The anxiety of the English to save the stronghold from falling into the hands of the Scotch led to the memorable battle of Bannockburn, June 24, 1314, in which Bruce commanded in person. The English, under Edward II., numbering, it is said, about 100,000 men, were totally routed, leaving 30,000 dead upon the field; while the Scots, who were only 30,000 strong, with 15,000 camp followers, lost about 5000. In 1317 Bruce passed over to Ireland to assist his brother Edward, elected King of that country, and defeated the Anglo-Irish under the Baron of Clare. In the spring of 1318 the Scotch army invaded England by the way of Northumberland. The English King retorted by an invasion into Scotland, but was compelled to retreat, and was followed by Bruce, who besieged Norham Castle, and defeated Edward once more at Biland Abbey, Yorkshire. A truce, to last for thirteen years, was concluded at Berwick on June 7, 1323. On the accession of Edward III., in 1327, hostilities recommenced; but the Scots were again victorious, and a final treaty was ratified in a parliament at Northampton, April, 1328, recognizing the independence of Scotland and Bruce's right to the throne. A victim to leprosy, the King spent the last two years of his life at Cardross Castle, on the northern shore of the Firth of Clyde, and died June 7, 1329. His heart, extracted and embalmed, was delivered to Sir James Douglas to be carried to Palestine and buried in Jerusalem. Douglas was killed fighting against the Moors in Spain, and the sacred relic of Bruce, with the body of its devoted champion, was brought to Scotland and buried in the monastery of Melrose. Bruce's body was interred in the abbey church of Dunfermline, and in clearing the foundations for a third church on the same spot in 1819 his bones were discovered. He was twice married: (1) to Isabella, daughter of Donald, tenth Earl of Mar, by whom he had issue, a daughter, Marjory, wife of Walter, the High Steward, whose son ascended the throne as Robert II.; and (2) to Elizabeth, daughter of Aymer de Burgh, Earl of Ulster, who bore him a son, who succeeded him as David II., and two daughters. Consult: Kerr, *Life and Reign of Robert the Bruce* (Edinburgh, 1811); and Longman, *History of the Life and Times of Edward III.* (London, 1869).

BRUCE, or BRUS, THE. See BARBOUR, JOHN.

BRU'CEA (named after the African traveler, J. Bruce). A genus of shrubs somewhat doubtfully referred to the order Simarubaceæ. *Brucea antidysenterica*, or *ferruginea*, is an Abyssinian species, the leaves of which are said to be tonic, astringent, and useful in dysentery. Those of *Brucea sumatrana*, a native of the Indian Archipelago, China, etc., possess the same medicinal properties. The seeds of this species contain saponin, quassin, a bitter principle, etc., and are locally of repute as a specific for dysentery. They are intensely bitter. The Abyssinian species acquired a fictitious importance in the beginning of the Nineteenth Century from a mistaken belief that it produced the dangerous false Angostura bark, and in this belief the name *Brucine* (q.v.) was given to an alkaloid really produced by the Nux vomica (q.v.) and other species of Strychnos (q.v.). See ANGOSTURA BARK.

BRUCE-JOY, ALBERT (1842—). An Irish sculptor, born in Dublin. He studied at South Kensington and the Royal Academy, and afterwards in Rome. He has made a number of statues of prominent men for the public buildings of London. Among these are "Matthew Arnold" (Westminster Abbey), "Adams the Astronomer" (Westminster Abbey), and the "Archbishop Benson Memorial" (Rugby Chapel, 1898). His portrait bust of Depew is at the Lotus Club, New York City, and he also produced the Ayer colossal lion in Lowell, Mass.

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BRUCH, brōōg, MAX (1838—). A German composer. He was born in Cologne, of Jewish parents, on January 6, 1838. At first taught by his mother, then by Breidstein, he exhibited remarkable precocity, producing a symphony at 14. As a Mozart scholar (1853-57) he was instructed by Hiller in theory and composition, and by Reinecke and Breunung in piano. In 1863 he brought out the opera *Lorelei*, with Geibel's libretto, written for and partly set to music by Mendelssohn. In 1865 he was made director of the Musikinstitut in Coblenz, and in 1867 became kapellmeister to the Prince of Schwarzburg-Sondershausen. In 1870 he went to Berlin, was conductor of the Liverpool Philharmonic Society (1880-83), of the Breslau Orchestral Society (1883-90), and afterwards lived in Berlin and Bonn. He visited the United States in 1883 and conducted his oratorio *Arminius* in Boston. Max Bruch ranks among the first musicians of Germany as the representative of the epic cantata. His works include orchestral and chamber music; the operas *Jungfrau von Orleans* (Cologne, 1859) and *Hermione* (Berlin, 1872); *Römischer Triumphgesang*, for male chorus and orchestra, op. 19; the cantatas *Frithjof*, *Salamis*, *Normannenzug*, *Die Flucht der heiligen Familie*, op. 20; *Schön Ellen*, op. 24; *Odysseus*, op. 41; *Das Lied von der Glocke* (Schiller's poem), op. 45; and *Achilleus*, op. 50. The *Scenes from the Frithjof Saga* are the best known of his orchestral works. *Kol Nidrei*, a Hebrew melody for the 'cello, and his violin concerto are the best known of his concert pieces. Consult Fuller-Maitland, *Masters of German Music* (London, 1894).

BRUCHSAL, brōōg'zäl (Mediæval *Bruxolegum*, from Ger. *Brücke*, OHG. *brucka*, Engl. *bridge* + *Saalbach*). A town of the Grand Duchy of Baden, Germany, situated on the Saalbach, and on the railway between Heidelberg and Karlsruhe, 12 miles northeast of the latter place (Map: Germany, C 4). Among its interesting buildings are the Church of Saint Peter, the burial-place of the bishops of Speyer, and the old castle. Its manufactures include cigars, soap, candles, lamps, barrel-staves, and gunstocks. It is an important railway centre. Population, in 1890, 11,902; in 1900, 13,567.

BRUCINE, brōō'sĭn (from *Brucea*, for which the *Strychnos nux vomica* was mistaken), $C_{23}H_{26}N_2O_4$. One of the alkaloid constitutents of poison-nut, the seed of *Strychnos nux vomica*, and therefore present in the extracts and the tincture of nux vomica, which are used in medicine. It may be isolated from the seed by boiling with water containing some oxalic acid. Its physiological action is the same as that of strychnine, though much less powerful. It is scarcely soluble in water and insoluble in ether, but is soluble in alcohol and in chloroform. It dissolves in nitric acid with a beautiful blood-red color, which turns yellow on warming the solution; if stannous chloride is now added, an intense violet coloration is produced. By this reaction very small quantities of brucine may be detected. Both strychnine and brucine are combined in nux vomica with igasuric acid. The *Strychnos nux vomica* is indigenous to India and the East Indian Islands.

BRU'CITE (named for a New York mineralogist, Dr. Bruce). A native hydrate of magnesium having the composition MgO_2H_2, but containing also small quantities of magnesium carbonate. It is found at Hoboken, N. J., at Lancaster and Texas, Pa., and in several other localities. The mineral is completely soluble in acids.

BRUCK, brōōk, KARL LUDWIG, Baron (1798-1860). An Austrian statesman, born at Elberfeld. He formed the plan of consolidating all the insurance societies of Trieste into one company, and thus was originated the Trieste Lloyd (1833), afterwards known as the Austrian Lloyd. In 1848 he was a deputy to the National Assembly at Frankfort, where he was appointed the plenipotentiary of Austria to Archduke John, Vicar of Germany. He later became Minister of Commerce in the Schwarzenberg-Stadion Cabinet, in which capacity he may be said to have created a new industrial epoch in Austria. The Austro-German Postal Union (December 5, 1851), the Austro-German Telegraph Union, and commercial and customs reforms were the results of his administration. His policy was utterly at variance with reactionary tendencies, and in 1851 he was compelled to resign. He was recalled in 1855 to accept the portfolio of Finance, but later found himself unable to cope with the disastrous conditions resulting from the general political system of the country and the obligations entailed by the Italian War of 1859. The unfortunate state of the finances was attributed directly to the Minister. Under these circumstances he demanded and received his release from office, and on the day following (April 23, 1860) committed suicide. An inquiry into his official life, which was subsequently held, completely vindicated his integrity.

BRÜCKE, bruk'e, ERNST WILHELM von (1819-92). A German physician and physiologist, born in Berlin. He studied medicine at the universities of Berlin and Heidelberg, in 1846 became an instructor in anatomy at the Academy of Fine Arts, Berlin, and in 1848 professor of physiology at the University of Königsberg. In 1849 he was called to the chair of physiology and microscopic anatomy at the University of Vienna. Among his more important works are an *Anatomische Beschreibung des Augapfels* (1847); *Grundzüge der Physiologie und Systematik der Sprachlaute* (1856), and a *Neue Methode der phonetischen Transkription* (1863).

BRÜCKER, bruk'ĕr, JOHANN JAKOB (1696-1770). A German writer on the history of philosophy. He was educated in Jena, and taught there for some years, and then became pastor of the Protestant Church of Saint Ulrich in his native place, Augsburg. He was made a member of the Berlin Academy of Sciences in 1731. His chief work was *Historia Critica Philosophiæ* (5 vols., 1742-44), which had a great success, and formed the basis of many subsequent works. He wrote many other works on philosophical subjects, and superintended and corrected a polyglot edition of Luther's translation of the New Testament (6 vols., 1766-70).

BRÜCKNER, bruk'nĕr, ANTON (1824-96). An Austrian organist and composer, born at Ansfelden, Upper Austria. He was an orphan and largely self-taught, but such was his diligence that in 1855 he won the position of organist in Linz in an open competition. He later became Court organist in Vienna, and a professor at the Conservatory of Music. As a composer Brückner sought to apply Wagner's dramatic effects to

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symphonies, with the result that they are harsh and unharmonic. In addition to his nine symphonies, of which the best known is the seventh in E major (1885), he wrote a *Te Deum* (1886), *Grand Masses*, a *Requiem*, male choruses, etc.

BRÜCKNER, brụk'ner, ALEXANDER (1856—). An Austrian Slavic scholar. He was born in Tarnople (Galicia) and studied in Lemberg. He made special researches regarding the history of Polish literature during the Middle Ages and in the Seventh Century. In 1892 he was appointed professor of Slavic languages and literature in the University of Berlin. He published numerous essays in the *Archiv für slawische Philologie; Die slawischen Fremdwörter im Litauischen* (1877); *Die slawischen Ansiedlungen in der Altmark und im Magdeburgischen* (1879); and other works.

BRÜCKNER, ALEXANDER (1856—). A Russian historian. He was born in Saint Petersburg and studied in Heidelberg, Jena, and Berlin. He was professor of history at the Imperial School of Law (1861-67), private lecturer at the university, and professor of Russian history at Odessa, Dorpat (1872-91), and Kazan (1891). He is the author of a large number of important works bearing upon Russian history and conditions, including *Finanzgeschichtliche Studien. Kupfergeldkrisen* (1867); *Iwan Possoshkoff. Ideen und Zustände im Zeitalter Peters des Grossen* (1878); *Die Europäisierung Russlands. Land und Volk* (1888). The works written by him in Russian include *The Russo-Swedish War of 1788-90* (1890) and *Potemkin* (1892).

BRUEDER-GEMEINDE (brụ'dēr ge-mīn'de) **MEN'NONITES.** See MENNONITES.

BRUEYS, brụ-ēs', DAVID AUGUSTIN DE (1640-1723). See PALOPRAT, JEAN.

BRUGES, brụzh (Ger. *Brügge*, Dutch *Brugge*, O. Dutch *Bruggen*, bridges, from OHG. *brucka*, Ger. *Brücke*, AS. *brycg*, Engl. bridge). An old city of Belgium, capital of the Province of West Flanders, situated about 8 miles from the North Sea, with which it is connected by two canals (Map: Belgium, B 3). The town is intersected by numerous canals crossed by fifty-four bridges, from which latter it derives its name.

From a purely architectural point of view Bruges, more than any other city of Belgium, has preserved the characteristic appearance of the Middle Ages. Among the most interesting buildings are the Hôtel de Ville, a graceful structure in pure Gothic style, with six turrets, dating from the Fourteenth Century; Les Halles, erected in the Thirteenth Century, surmounted by a superb belfry, with its forty-eight bells, reputed to be among the finest chimes in Europe; the Palais de Justice, notable as containing in one of its rooms a celebrated chimney-piece—an exquisite specimen of wood-carving, with the statues of Charles V., Maximilian, Mary of Burgundy, and Charles the Bold amid a maze of ornaments, escutcheons, and portraits. In the ancient Hospital of Saint John, dating from the Twelfth Century, are preserved some choice paintings by Memling: his most famous, the "Reliquary of Saint Ursula"; the beautiful "Triptych of the Marriage of Saint Catharine," and the "Epiphany," the best example of that master's early style. The Church of Notre Dame, an early Gothic structure, with a tower 395 feet high, contains a number of valuable paintings and sculptures, notably the tombs of Charles the Bold and Mary of Burgundy, and an exquisite life-size marble group of the Virgin and Child, attributed to Michelangelo, by whom it was undoubtedly at least designed. Horace Walpole is said to have offered 30,000 florins for it. The Cathedral of Saint Sauveur is a plain brick structure in the early Gothic style, but its interior has good proportions, is tastefully decorated, and contains fine paintings by eminent masters, two monumental brasses, and beautiful choir-stalls. The Chapelle du Saint-Sang is an elegant two-storied building with fine stained-glass windows, the lower church dating from 1150, the upper from the Fifteenth Century. The edifice was restored in 1819-39. Here, according to tradition, Theodoric of Alsace deposited some drops of the blood of the Saviour brought from Palestine in 1149, the 700th anniversary of which event was celebrated in 1850 with all ecclesiastical pomp. The picture-gallery of the academy in the museum is noteworthy for its choice specimens by early Flemish masters.

Bruges contains an academy of art, a conservatory, and two hospitals. The population was 49,308 in 1846, 47,497 in 1899, and 52,867 in 1900.

It is believed that Saint Chrysolus preached here as early as the Third Century. In the Middle Ages Bruges became one of the chief commercial centres of northern Europe, with about 200,000 inhabitants. From 1240 to 1426 it was a leading mart of the Hanseatic League. It formed part of the possessions of the dukes of Burgundy, and, with the rest of Flanders, passed to the House of Hapsburg. Internal disorders, coupled with the neglect of its port, led to a steady decline of its commerce, and its greatness has long since left it. Hardly another city of Europe has such a large proportion of paupers. Bruges has extensive textile mills, breweries, and ship-yards, and produces fine lace. During the wars of the Spanish and Austrian successions the city was besieged by the Dutch and the French. In 1794 it was taken by the latter, and from 1814 to 1830 it belonged to the Netherlands.

BRUGG, BRUG, or **BRUCK** (OHG. *brucka*, Ger. *Brücke*, AS. *brycg*, Engl. *bridge*, referring to the stone bridge across the Aar, built in the Sixteenth Century). A village in the Canton of Aargau, Switzerland, 1100 feet above the sea-level, on the right bank of the Aar, and near the mouth of the Reuss, about 13 miles northeast of Aargau (Map: Switzerland, C 1). Brugg occupies a portion of the site of the ancient Helvetian and Roman city of Vindonissa. The "Schwarze Turm" (Black Tower) was erected during the Roman occupation. The town was the seat of the Counts of Hapsburg, the ruins of their chief castle being 2 miles to the southwest. Zimmermann was born at Brugg. Population, in 1900, 2629.

BRUGMANN, brōōg'mân, FRIEDRICH KARL (1849—). A German comparative philologist, born in Wiesbaden, March 16, 1849. He studied in Halle and Leipzig, and was instructor in the gymnasium in Wiesbaden from 1872 to 1873, and in Leipzig from 1873 to 1877. In 1877 he became privat-docent at the University of Leipzig, and in 1882 was appointed assistant professor. He was called to the chair of comparative philology in Freiburg in 1884, and in 1887, after the death of

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Curtius, he was recalled to Leipzig to succeed the latter. With Osthoff (of Heidelberg) Brugmann became the foremost representative of the new and revolutionary school of philologists known as *Junggrammatiker* or 'Neo-grammarians.' This school followed Leskien, especially in urging the inviolability of laws of sound-changes, and in emphasizing the working of analogy as an important linguistic factor, as well as in laying stress on the observation of phonetic laws and their operation in modern languages. These principles Brugmann developed with Osthoff in their *Morphologische Untersuchungen auf dem Gebiet der indogermanischen Sprachen* (Vol. I.-IV., 1878-87; Vol. V., 1889). Very important in the history of the new movement was Brugmann's article on "Nasalis Sonans," in Curtius's *Studien zur griechischen und lateinischen Grammatik*, Vol. IX. (Leipzig, 1897). The views advanced in this paper were so much in opposition to the ideas of Curtius that a personal rupture between the men was the final result. The theories of the development of the Indo-Germanic vocalic nasal are, however, to-day universally acknowledged by linguists, although the battle between the old school and the new raged for twenty years. Brugmann's greatest contribution to philology is the monumental work, *Grundriss der vergleichenden Grammatik der indogermanischen Sprachen*, the first edition of which appeared in two volumes of four parts each (1886-1900), with an additional three volumes on Syntax by Delbrück (1893-1900). This edition, without the syntax, was translated into English in 5 vols. (1888-95), and the publication of a second edition was begun in 1897. In this work Brugmann collects and classifies with great learning the vast mass of material bearing upon the phonology and inflection of the Indo-Germanic languages. Other important works of Brugmann are: *Ein Problem der homerischen Textkritik* (1876); *Litauische Volkslieder und Märchen*, in collaboration with A. Leskien (1882); *Zum heutigen Stand der Sprachwissenschaft* (1885); *Griechische Grammatik* (2d ed., 1900); *Kurze vergleich. Grammatik* (1902). In connection with W. Streitberg he is editor of the *Indogermanische Forschungen* (Strassburg, 1892 et seq.). He has been knighted by the King of Saxony, and in 1896 he was invited, with other distinguished scholars, to attend the Jubilee of Princeton University, New Jersey, where he received the degree of Doctor of Laws.

BRUGSCH, brōōksh, Heinrich Karl (1827-94). A German Egyptologist. He was born in Berlin, February 18, 1827. At the age of 16 he applied himself with signal success to the decipherment of Demotic, which had been neglected since the death of Champollion in 1832. Brugsch's work, *Scriptura Ægyptiorum Demotica* (Berlin, 1848), containing the results of his studies in this difficult branch of Egyptology, appeared while he was a student at the gymnasium. It was followed by his *Numerorum Demoticorum Doctrina* (1849), and his *Sammlung demotischer Urkunden* (1850). His *Grammaire démotique* (Paris, 1855) formed the basis of all subsequent studies in Demotic. After completing his philological and archæological studies, Brugsch visited the museums of Paris, London, Turin, and Leyden, and in 1853 went to Egypt for a stay of some duration. After this he returned to Berlin, where, in 1854, he was appointed privat-docent in the university, and, in 1855, assistant in the Egyptian department of the Royal Museum. He again visited Egypt in 1857, and in 1860 accompanied in an official capacity the embassy sent to Persia by the Prussian Government. On the death of the chief of the embassy, Baron von Minutoli, Brugsch assumed the management of affairs and acquitted himself with credit. In 1864 he was consul at Cairo. He returned to Germany four years later and held, for a time, a professorship in Göttingen; but in 1870 he was recalled to Egypt by the Khedive to take the direction of the Ecole d'Egyptologie. In 1873 he represented the Egyptian Government at the Vienna Exposition, and in the same year received the title of Bey and was placed in charge of the projected museum of Arabic antiquities. He later received the title of Pasha. In 1876 he visited America as commissioner of the Egyptian Government to the Centennial Exposition in Philadelphia. He returned to Egypt, but failing to receive the position of director of the Egyptian Museum at Gîzeh, left vacant by Mariette's death, Brugsch took up his residence in Berlin. There he lectured at the university, but was, in 1883 and again in 1885, sent by the German Government on a mission to Persia. After his return he retired to Charlottenburg, where he passed the remainder of his days in literary work. He died September 9, 1894. After his early achievements in the elucidation of Demotic, Brugsch soon applied himself to other branches of Egyptology, and everywhere with remarkable success. Egyptian grammar and lexicography, together with the geography, history, and religion of ancient Egypt, were the subjects to which his attention was chiefly directed. To his great natural ability he added an enormous capacity for work, and he was a most prolific writer. Among the most important of his works besides those mentioned are his *Geographische Inschriften* (Leipzig, 1857-60); *Histoire d'Egypte* (Leipzig, 1859); *Recueil des monuments Egyptiens* (Leipzig, 1862-63); *Hieroglyphisch-demotisches Wörterbuch* (Leipzig, 1867-82); *Dictionnaire géographique de l'ancienne Egypte* (Leipzig, 1877-81); *Hieroglyphische Grammatik* (Leipzig, 1872); *Geschichte Ægyptens* (Leipzig, 1877); *Religion und Mythologie der Ægypter* (Leipzig, 1887); and *Thesaurus Inscriptionum Ægyptiacarum* (Leipzig, 1883-91). He was the founder (1863) of the Egyptological journal, *Zeitschrift für Ægyptische Sprache*. The influence of Brugsch on modern Egyptology has been very great.

BRÜHL, brul, Heinrich, Count von (1700-63). Prime Minister of Augustus III. of Poland and Saxony. He was born near Weissenfels, in Thuringia. His attractive personality and courtly address won him the favor of Augustus II., and after Augustus's death, that of his son. Rapidly passing through various grades of office, he became Prime Minister in 1746, and, obtaining complete control of the Government, held it till his death. Avarice was his guiding motive, and to gratify this passion he burdened the country with taxes, wrecked the treasury, solicited bribes, appropriated estates, and grasped the income of numberless offices. He surrounded the weak Augustus with spies, and made him absolutely pliable to his will. Vanity made him ostentatious and impelled him to outdo all others, even the King, in magnificence. In his foreign policy he was vacillating and mercenary. The demoraliza-

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tion of the Saxon Army, the unwise alliance with Austria, and the disaster at Pirna (q.v.), may be attributed to Brühl's course during the wars of Frederick. King and Minister fled to Warsaw after the loss of the Saxon Army in 1756. Both came back to Dresden when peace was made at Hubertsburg, and both died there in October, 1763. Consult Justi, *Leben des Grafen von Brühl* (Göttingen, 1760-61).

BRUHNS, brōōns, KARL CHRISTIAN (1830-81). A German astronomer, born in Plön (Holstein). He studied practical mechanics, in 1852 was appointed an assistant in the Berlin Observatory, and in 1859 became a lecturer at the university. In 1860 he was appointed professor of astronomy and director of the observatory at the University of Leipzig. He discovered six comets, in 1863 organized the meteorological service of Saxony, and in 1878 established in Leipzig one of the first German bureaus for the publication of weather forecasts (later transferred to Chemnitz). His publications include many contributions to periodicals and reports, *Die astronomische Strahlenbrechung in ihrer historischen Entwickelung* (1861), and an excellent biography (1869) of J. F. Encke, the Berlin astronomer (q.v.).

BRU'IN, SIR. The bear; the king's messenger in *The History of Reynard the Fox*, who speeds with Reynard to his own discomfiture. See REYNARD THE FOX.

BRUIS, brụ'ē', or **BRUEYS**, PETER DE. See BRUYS.

BRUISE (OF. *bruiser*, Fr. *briser*, AS. *brȳsan*, to break, bruise), or CONTUSION. An injury inflicted by a blow or sudden pressure, in which the skin is not necessarily wounded. Both terms, and especially the latter, are employed in surgery to include such injuries in their widest range, from a black eye to a thoroughly crushed mass of muscle. In the slighter forms of this injury, as in ordinary simple bruises, there is no tearing, but only a concussion of the textures, the utmost damage done being the rupture of a few small blood-vessels, which occasions the discoloration that is always observed in these cases. In more severe contusions, the subjacent structures—muscles, connective tissue, vessels, etc.—are more or less ruptured, and in extreme cases are thoroughly crushed, and usually become gangrenous. The quantity of blood that is extravasated mainly depends upon the size and number of the ruptured blood-vessels, but partly also on the nature of the tissues injured. Thus, a lax tissue, as that of the eyelids, favors the escape of blood into the surrounding parts. The most characteristic signs of a recent contusion are more or less shock (q.v.), pain, swelling, and discoloration of the surface from effused blood. (See ECCHYMOSIS.) There is nothing special in the character of the shock, but it is worthy of notice that it is most severely felt in injuries of special parts—as the testes, the breasts, and the larger joints, which are often followed by remarkable general depression, faintness, loss of muscular power, and nausea. The immediate pain following the blow is succeeded by a feeling of numbness, which, after a varying time, unless the part is killed, gives place to a heavy, aching pain. Although some depression may usually be observed immediately after the infliction of the blow, swelling of the parts rapidly follows, as may be well seen in the case of a child receiving a blow on the head, or of the wheal that rises after the lash of a whip. In lax parts, such as the eyelids, the swelling is often considerable, and may remain for a week or more; but in other parts it usually subsides in two or three days. The discoloration passes successively through the variations of red, purple, black, green, and yellow. It is due to the effused blood and the changes which subsequently take place in it. The fluid part of the blood and the colorless corpuscles are reabsorbed in the process of repair, but the red corpuscles are left behind, and it is the transformation of their hæmoglobin into hæmatoidin which brings about the characteristic color-changes.

As a result of contusion we may have a hæmatoma, or blood-tumor, sloughing of a part, septic infection of the extravasated blood or abscess, inflammation of special structures, as nerve-trunks, synovial membranes of joints, tendon-sheaths, the periosteum of bone, etc. It seems fairly recognized that certain tumors, malignant and benign, may be stimulated to growth from a contusion. The treatment of contusion consists in stimulating measures to combat shock when present; locally rest and elevation of the parts are indicated, together with moist and cold or hot applications in the first stage to allay pain and inflammation. When inflammation has subsided, massage and stimulating applications should be employed to hasten absorption of the effused blood-products.

BRULGRUD'DERY, DENNIS. The Hibernian host of the Red Cow, in Colman the Younger's comedy *John Bull;* a quaint character, with all the humor of his race.

BRÜLL, brụl, IGNAZ (1846—). An Austrian pianist and composer, born in Prossnitz, Moravia. He studied the pianoforte under Epstein, and composition under Rufinatscha and Dessoff, and appeared in concerts in Vienna and London with success. His works for the orchestra have given him fame as a composer, and he has also written chamber music and several operas, which have taken a place in the modern repertory. These include *Das goldene Kreuz* (Berlin, 1875), his best-known work; *Königin Mariette* (Munich, 1883); *Das steinerne Herz* (Vienna, 1888), and the comic opera *Der Husar* (1898).

BRUMAIRE, brụ'mâr' (Fr., from Lat. *bruma*, winter). The second month in the Republican calendar of France. It extended from October 22 to November 20 in the years I.-III. and V.-VIII.; from October 23 to November 21 in the years IV., VIII.-XI., XIII. and XIV.; and from October 24 to November 22 in the year XII. The celebrated 18th Brumaire of the year VIII., which witnessed the overthrow of the Directory and the elevation of Napoleon as First Consul, corresponds with November 9, 1799, of the Gregorian Calendar. See CALENDAR; FRANCE.

BRUMIDI, brōō-mē'dē, CONSTANTINE (1805-80). An Italian historical painter, born in Rome. He studied in Rome, and painted frescoes in the Vatican under Gregory XVI., besides adorning many palaces of his native city. When Rome was occupied by the French in 1849 he came to America, and was naturalized in the United States, in 1852. The first frescoes painted in America were the work of his hand, and may be seen in the Capitol in Washington. They

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represent scenes from American history (illustrating the career of Washington), in addition to work of an allegorical character. He visited Mexico in 1852, shortly after his arrival in the United States. He decorated churches in Philadelphia and in the City of Mexico. He died in Washington.

BRUM'MAGEM. A corruption of the name of Birmingham (q.v.), England. Of the many ways of spelling the name of this city, the oldest is that given in *Domesday-Book*—namely, Birmingeham. This was corrupted into Brummagem, a term which has become synonymous with worthless wares with a glittering outside, since various kinds of cheap sham ware, especially jewelry, are manufactured in Birmingham.

BRUMMAGEM JOE. A name contemptuously given by his political opponents to the Rt. Hon. Joseph Chamberlain.

BRUM'MELL, GEORGE BRYAN (1778-1840). An Englishman of wealth and fashion, better known as 'Beau Brummell.' He was born in London, and was celebrated as an exquisite and a fop. He became an intimate companion of the Prince of Wales, afterwards George IV., and was looked upon by the society of his day as the 'glass of fashion and the mold of form.' For many years he was a veritable *arbiter elegantiarum*, and was regarded by the Court society as an oracle upon all matters of dress and etiquette. As long as his fortune lasted, or the Prince of Wales would furnish the means, he kept up an elegant bachelor establishment in London; but he finally lost the favor of his royal friends, became poor, gambled recklessly, fled from his creditors, and died in Çaen, France, in a hospital for the mendicant insane. Bulwer's *Pelham* is said to be founded on Brummell's life. Consult Jesse, *Life of George Brummell, Esq.* (new ed., London, 1885).

BRUNANBURH, brōō'nan-bu̯rk. The scene of Æthelstan's victory over the Scotch and Irish in 937. The battle, which probably took place in some part of Northumbria, is celebrated in a ballad in the Anglo-Saxon Chronicle.

BRUNCK, brōōn̯k, RICHARD FRANÇOIS PHILIPPE (1729-1803). A distinguished French classical philologist, born in Strassburg, December 30, 1729. He was educated under the Jesuits in Paris, but abandoned his studies, and for some time was engaged as a military commissary during the Seven Years' War. A professor in Giessen, with whom Brunck happened to lodge while the army was in winter quarters, revived in him the love of classical studies, so that on his return to Strassburg he devoted all his spare time to Greek, and soon distinguished himself as an able but audacious critic and emendator. His belief that all inaccuracies in ancient Greek writings were introduced by copyists often led him astray; but, in spite of this, he did good service to Greek literature.

His first work, *Analecta Veterum Poetarum Græcorum* (1772-76), was followed by editions of Anacreon (1778-86); Apollonius Rhodius (1780); Aristophanes (1781-83); Gnomic Poets (1784); Vergil (1785); and Sophocles (1786-89). The last of these established a new era in the criticism of the tragic writers. The outbreak of the French Revolution interrupted Brunck's studies. He ardently attached himself to the popular side. During the Reign of Terror he was imprisoned, but was liberated after the downfall of Robespierre. His means, however, had been so much reduced that he was compelled to sell his valuable library. From this time (1801) he turned his attention from Greek to Latin literature, and published editions of Plautus and Terence. He died June 12, 1803.

BRUNE, brṵn, GUILLAUME MARIE ANNE (1763-1815). A French marshal of the First Empire, born at Brives-la-Gaillarde. He became a journalist and a participant in the Revolutionary movement, taking part with Danton (q.v.) in the establishment of the Cordeliers Club. After the conquest of Belgium he was sent as civil commissioner to that country, but soon entered the military service. In 1796 he was in the Army of Italy, where his abilities advanced him to the rank of division general. In 1798 he was sent to organize the Helvetic Republic, and after accomplishing his mission was appointed to command the Army of Holland, where he enhanced his military reputation. In September and October, 1799, he defeated the English and Russian forces, and compelled the Duke of York, commander of the allied armies, to accede to the humiliating capitulation of Alkmaar. After distinguishing himself in La Vendee, and subsequently in Italy, he was sent on a mission to the Sublime Porte. In 1804 he was made a marshal, and the Legion of Honor was conferred upon him. As Governor-General of the Hansa towns he subdued Swedish Pomerania. In 1814 Brune transferred his allegiance to Louis XVIII., but became again a partisan of Napoleon. He was murdered by a Royalist mob at Avignon, August 2, 1815.

BRUNEI, brōō-nī'. The most important town of the State of the same name in British Borneo. It is situated on the northern coast of the island, above the mouth of the river of Brunei (Map: East Indies, D 4). It is exceedingly unhealthful, and a number of houses are built on the water. There is some trade with Singapore. The population is estimated at 10,000.

BRUNEL', ISAMBARD KINGDOM (1806-59). An eminent English engineer, son of Sir Mark Isambard Brunel. He was born in Portsmouth, and was educated at the Collège Henri Quatre, in Paris. His first practical engineering work was under his father, then engaged in constructing the Thames Tunnel. Brunel early began the designing of bridges, and several suspension bridges were built from his plans. He is best known, perhaps, as the designer and civil engineer of the *Great Western*, 1838, the first steamship built for regular transatlantic service; of the *Great Britain*, 1845, the first ocean screw-steamer; and of the *Great Eastern*, 1858, for many years the largest vessel in the world. In 1833 Brunel was appointed chief engineer to the Great Western Railway, and designed and constructed the tunnels, bridges, viaducts, and arches for this line and its branches, giving the road a gauge of seven feet. He designed many docks at English seaports, including those of Monkwearmouth, Plymouth, Briton Ferry, and Milford Haven. In 1842 he was employed by the Government to construct the Hungerford suspension bridge across the Thames at Charing Cross, London.

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In 1850-53 he constructed the works of the Tuscan portion of the Sardinian railway system.

BRUNEL, Sir MARK ISAMBARD (1769-1849). An English engineer, who constructed the Thames Tunnel. He was born at Hacqueville, near Gisors, France. He early showed an inclination for mechanics, preferring the study of the exact sciences to the classics. After leaving school he served in the French Navy for six years, and in 1793, forced to leave France on account of his political opinions, he came to America. He settled in New York as civil engineer and architect, and was engaged in a number of important surveys, including that of a canal between Lake Champlain and the Hudson River. He prepared a set of plans for the Capitol in Washington, which, while accepted, could not be carried out on account of the expense involved; he also designed and constructed the Bowery Theatre in New York. He was appointed chief engineer of New York, and prepared plans for the defenses of the city. He went to England in 1799, and there made a number of inventions. His method for making ships' blocks was acquired by the English Government, and resulted in the saving of much money. His most noteworthy achievement was the Thames Tunnel, whose construction was commenced on plans devised by Brunel in 1825. In spite of many disasters, this work was successfully carried through and the tunnel opened in 1843. The strain, however, proved too much for his health, and he survived the completion of the work but a few years.

BRUNELLESCHI, brōō'nĕl-lĕs'kē, FILIPPO (c.1379-1446). The founder of Renaissance architecture. He was born in Florence, Italy. He first learned the art of a goldsmith; next, that of a sculptor; and finally devoted himself to architecture. He competed in 1401 for the bronze doors of the baptistery of Florence, but was vanquished in the famous contest by Ghiberti (q.v.); the panel of the 'Sacrifice of Isaac,' which he presented, is preserved. He was a realist in sculpture, as is shown, among other works, by his Crucifix. His goldsmith's work was good and somewhat akin to Gothic work; witness his share in the altar front in the Opera del Duomo. Having decided to study architecture and ancient ruins, he went to Rome with his young friend, Donatello (q.v.), who became afterwards the leader in Renaissance sculpture. His residence in Rome during the greater part of the years between 1401 and 1417 was largely spent in studying, drawing, and measuring the ancient Roman buildings, which were then in comparatively good preservation, before the vandalism of the Renaissance had begun. He attempted not only to revive the classic style in its artistic form, but to master the mechanical knowledge that underlay it; at the same time he did not violently break with mediæval art, as was shown by his design for the façade of the Gothic Church of Santa Maria Novella. In 1417 he returned to Florence as his permanent residence, and when it was proposed to complete the Gothic Cathedral of Santa Maria del Fiore by the construction of the dome, he was one of the famous architects who presented models in the competition. Brunelleschi was able to demonstrate not only how defective all the other proposed domes were, but that his own was the only solution. The architect was at first hampered by Ghiberti, a great sculptor but an incompetent architect, who was associated with him, but he soon became sole director. Evidently he had reacquired some of the skill in geometry as applied to architecture which had characterized the ancients and the Gothic architects of France, but in which the mediæval Italian had been deficient. Brunelleschi's dome was epoch-making—an octagonal double-shell dome, crowned by a lantern, and measuring 42 feet in diameter. Begun in 1420, the dome was completed in 1436. It was the greatest feat of mechanical skill then attempted in Italy. At almost the same time Brunelleschi began the Church of San Lorenzo (1420), in which he revived the really antique type of basilica (q.v.), with classic details, except for the use of internal round arches. Much later, in 1436, he commenced another basilica, Santo Spirito, which he did not have the opportunity to carry out. But the gem of his art, in which both conception and execution were his, is the Pazzi Chapel at Santa Croce (1430), in the form of a Greek cross surmounted by a dome, with a charming vestibule with dome and tunnel vault. The second cloister of Santa Croce, the Badia at Fiesole, the Loggia degli Innocenti, the Palazzo di Parte Guelfa, are proofs of his leadership in Florentine architecture up to the time of his death. His final masterpiece, begun in 1444, was the Pitti Palace, the most impressive and ruggedly majestic of Italian palaces. Brunelleschi trained several great architects who took up the work and carried it forward; chief of them was Michelozzo (q.v.). For his biography consult: Manetti, edited by Moreni (Florence, 1812); Fabriczy (Stuttgart, 1892); and Scott (London, 1901).

BRUNEL'LO. A baron in the suite of King Agramant, in Ariosto's *Orlando Furioso*. He is a lying dwarf, whom Bradamant outwits, and Agramant himself finally hangs, despite the interference of the enchantress, Marphisa. The character also occurs in Boiardo's *Orlando Innamorato*.

BRUNET, brụ'nâ', JACQUES CHARLES (1780-1867). A French bibliographer, born in Paris. He published a supplement to Duclos's *Dictionnaire bibliographique*, and in 1810 a widely used *Manuel du libraire et de l'amateur des livres* (3 vols.; 5th ed., 6 vols., 1860-65; ed., with 3 supplemental vols., by Deschamps and Brunet, 1870-80). His works also include, besides many excellent catalogues, *Nouvelles recherches bibliographiques pour servir de supplément au manuel* (1834), and *Recherches sur les éditions originales de Rabelais* (1852).

BRUNETIÈRE, brụn'tyâr', FERDINAND (1849—). The greatest systematic critic of contemporary French literature. He was born in Toulon; he studied there and in Paris, and first came into prominence in 1875 by critical work in the *Revue des Deux mondes*, a journal of which he afterwards became the editor (1895). In 1886 he was made professor of literature at the Ecole Normale in Paris, in 1887 member of the Legion of Honor, and in 1893 lecturer at the Sorbonne, and member of the Academy. In 1897 he lectured in the United States and afterwards attracted wide attention through his increasing zeal for Roman Catholicism as opposed to the tenets of the 'intellectuels' of France. His philosophical point of view has shifted from a materialistic to an idealistic pessimism. His literary criticism shows an immense and minute learning,

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apparent objectivity, and an impressive logical synthesis, manifested in a style always keen and cutting, often superciliously contemptuous; for though outwardly impersonal, his criticism is in fact strongly prejudiced. Hence he is more popular with the public than with his fellow publicists, who find him more intent to "classify, weigh and compare, than to enjoy or help others to enjoy" (Lemaître). His greatest service to the study of literature has been to place the classical and romantic periods in true perspective with the Eighteenth Century and the present day. Throughout, he sees, with Taine, a natural evolution in literary tradition, although he accords greater play to individuality. Even the 'Naturalists,' Zola, the Goncourts, and other of his pet abominations, are grudgingly admitted to have been of service in 'drawing our writers from the cloudy summits of old-time romanticism to the level plains of reality.' Brunetière's greatest work is his marvelously condensed *Manuel de l'histoire de la littérature française* (1897), which has been defectively translated (New York, 1899). Other important works are: *Evolution des genres dans l'histoire de la littérature*, Vol. I. (1890), a history of criticism; *Les époques du théâtre français* (1892); *L'évolution de la poésie lyrique en France au XIXe. siècle* (1894); and *Le roman naturaliste* (1883). Fifteen volumes of essays are collected under various titles as *Nouvelles questions de critique* (1890); *Histoire et littérature* (1884-86); *Etudes critiques sur l'histoire de la littérature française* (1880-98); *Discours académiques* (1901). In recent years his work has appeared less frequently and is usually political, ethical, or social even in its treatment of literary subjects.

BRUNFELS, brōōn'fĕls, Otto (1488-1534). A German physician and botanist, born in Mainz. He became a member of a Carthusian community near there, but subsequently turned Protestant, and was pastor in Steinheim and Neuenburg. Ultimately he abandoned his pastoral office, studied medicine, and died as a physician in Bern. In his *Historia Plantarum* (1530-36), he was the first to describe the native plants of Germany. The text was accompanied by illustrations in outline.

BRUNHIL/DA, or **BRUNEHAUT,** brụn-hō' (c.550-613). Queen of Austrasia and the daughter of Athanagild, King of the Visigoths. Brunhilda was wedded to Sigibert I. of Austrasia, while her sister, Galswintha, became the wife of Sigibert's brother, Chilperic, King of Neustria. Fredegunda (q.v.), the former concubine of Chilperic, soon recovered her ascendency over the King and caused Galswintha to be murdered in 567. Brunhilda determined to avenge herself on Fredegunda, and the annals of the next half-century in Gaul are filled with the bloody deeds provoked by the enmity of the two women. Brunhilda and her husband were successful at first, until Sigibert was murdered in 575 at the instigation of Fredegunda. Brunhilda herself was captured by Chilperic; but her beauty gained over Merovig, the son of Chilperic, who made her his wife and assisted her to escape. Merovig was put to death by his father, but Brunhilda returned to Austrasia and governed in the name of her son, Childebert I. Murders and wars continued, however, as long as Brunhilda was alive, for she exercised the real power in the kingdom, in the name of her son and grandson. Finally, the armies of Austrasia were overthrown in 613 by Clotaire II., son of Fredegunda; the aged Queen was taken captive and for three days subjected to insult and torture, then bound to a wild horse and dragged to death. Brunhilda was very beautiful, splendidly endowed, an able ruler, religious, a founder of churches, hospitals, and monasteries; but in her revenge she was implacable, and the wars which she brought about undermined the power of the Merovingians.—Another Brunhilda is the heroine of the Norse legend of Sigurd or Siegfried, traces of which are found in the *Nibelungenlied.* She is a Valkyre (q.v.), and is rescued from a couch surrounded by flames, on which she lies in enchanted sleep, by Sigurd, who bears her off and marries her, but, under the influence of sorcery, forsakes her. In her jealousy Brunhilda causes him to be murdered, and immolates herself on his funeral pyre.

BRUNI, brōō'nê. A long, irregular island southeast of Tasmania, lying south of Storm Bay and d'Entrecasteaux Channel. Area, 160 square miles. It is divided by a narrow isthmus into North and South Bruni Islands. The latter has a revolving light 335 feet above sea-level, and contains coal-mines.

BRUNI, Leonardo (1369-1444). An Italian humanist, born at Arezzo, and hence styled 'Aretino.' He was one of the most learned men who flourished during the epoch of the revival of Greek learning in Italy. He first studied law in Florence and Ravenna, but afterwards turned his attention to classical literature. In Rome he was Papal secretary under four Popes, and in 1414 attended John XXIII. to the Council of Constance. On the deposition of that Pope, he returned to Florence, where he was of service to the Republic in several important matters. His *Historiarum Florentinarum libri XII.* (Strassburg, 1610) procured for him the rights of citizenship, and in 1427, through the favor of the Medicean family, he was appointed State Secretary. He died in Florence, March 9, 1444. Florence and Arezzo vied with each other in the splendor with which they celebrated his obsequies. He aided in advancing the study of Greek literature mainly by his literal translations into Latin of Aristotle, Plato, Demosthenes, Plutarch, and others. Of his numerous original works the following may be mentioned: *Commentarius Rerum Suo Tempore Gestarum* (1476); *De Romæ Origine; Poliscene Comedia* and *Epistolæ* (1472); and lives of Dante and Petrarch in Italian (1672).

BRÜNIG (brụ'nĭk) **PASS.** A pass in the Swiss Alps, on the frontier-line between the Canton of Bern and Obwalden (Map: Switzerland, C 2). It lies at an altitude of about 3300 feet. It is crossed by a road leading from Lucerne to Brienz, constructed in 1857-62. Since 1889 there has been a railway line leading over the pass, and connecting Lucerne with Meiningen and Brienz.

BRUNIQUEL, brụ'nê'kĕl' (usually traced back to Queen Brunhilda or Brunehaut). A prehistoric station in Tarn-et-Garonne, France, where were found, in great abundance, the peculiarly chipped stone implements characteristic of the Magdalenian Epoch of prehistoric archæology. Consult Mortillet, *Le préhistorique* (Paris, 1900), for numerous references.

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BRUNLEES, Sir JAMES (1816-92). A Scottish civil engineer, born in Kelso. He studied at Edinburgh University, in 1838 became assistant engineer in the building of the Bolton and Preston Railway, one of the first constructed in England, and subsequently assistant to Sir John Hawkshaw on the Lancashire and Yorkshire system. Among the more important of his further works in railway construction were the São Paulo Railway of Brazil, and the Mersey Railway, with the subfluvial tunnel between Birkenhead and Liverpool, in which latter Sir Douglas Fox was joint engineer. In 1868-77 he built the Avonmouth docks for Bristol. He was president of the Institution of Civil Engineers in 1882-83. His publications comprise several reports and technical papers.

BRÜNN, brŭn (Chech *Bruno*, OCh. Slav. *brunije*, mud, Slav. *brn*, loam, clay, whence a section of Altbrünn still bears the name Lehmstätte, 'mud city'). The capital of the Austrian Crownland of Moravia, beautifully situated at the confluence of the Schwarzawa and the Zwittawa, at the foot of the Spielberg, in latitude 49° 12′ N., and longitude 16° 40′ E., about 89 miles north-northeast of Vienna (Map: Austria, E 2). The fortifications, which until 1860 surrounded the old town, have been converted into pleasant promenades and handsome boulevards. Among the most interesting buildings of Brünn are the Cathedral of Saint Peter and Saint Paul, built in the Fifteenth Century; Saint James Church, a Gothic edifice, with a tower over 300 feet in height, magnificent stained-glass windows, containing the tomb of Count Radwit, the defender of the town in 1645 against the Swedes; the Church of the Minorites, with handsome frescoes; and the Church of the Capuchins, with the grave of Colonel Trenck. Among the notable secular buildings may be mentioned the Landhaus, the meeting-place of the Provincial Diet, the Rathaus, and the Episcopal Palace. At the summit of the Spielberg stands the Citadel, once the prison in which the Pandour leader Colonel Trenck died in captivity in 1749, and where the Italian author Count Silvio Pellico was detained a prisoner from 1822 to 1830. Brünn is the seat of a United States consular agency. The city's affairs are administered by a municipal council of forty-eight and an executive board of eleven members. The city owns its water-works, and operates gas and electric-light plants. Brünn is the most important manufacturing town in Austria-Hungary. It is particularly noted for its woolen industry. There are also manufactures of leather, machinery, chemicals, and beer. Its railway facilities are excellent, and a steam tramway accommodates local traffic. Population, in 1890, 94,500; in 1900, 108,900.

History.—Old Brünn dates back to the Ninth Century, though the new town was founded five hundred years later. In 1278 Brünn became a free Imperial city. The city has stood numerous sieges, from the period of the Hussite wars to the Austro-Prussian War of 1866.

BRUNN, HEINRICH VON (1822-94). A German archæologist, born at Wörlitz, in Anhalt. After studying at the University of Bonn, as a pupil of Welcker and Ritschl, he assisted in the work of the Archæological Institute of Rome (1843-53). He was lecturer on archæology at Bonn (1854-56); secretary of the Archæological Institute of Rome (1856-65), and professor of archæology at the University of Munich (from 1865 until his death). In addition to articles on Greek painting and Etruscan art, contributed to philological and archæological reviews, his publications include: *Geschichte der griechischen Künstler* (2d ed., 1889) and *I rilievi delle urne etrusche, I. Ciclo troico* (1870).

BRUNNEN, brōōn'nen (Ger., well, mineral spring). A village and port in the Canton of Schwyz, Switzerland, on lake of Lucerne, near the mouth of the Muotta (Map: Switzerland, C 2). The town has much of the lake traffic, and also is a considerable health resort. It is beautifully situated at the southeastern bend of the lake, and is celebrated in history as the place where, in December, 1315, the deputies of the forest cantons, who twenty-four years before had formed a plan for the liberation of their country from the Austrian yoke, laid the basis of the Helvetian Republic after the battle of Morgarten. Population, 3000.

BRUNNER, HEINRICH (1840—). An Austrian legal historian, born at Wels. After study at the University of Vienna, he became a professor at Lemberg (1866), Prague (1870), Strassburg (1872), and Berlin (1873). His contributions to the study of Frankish, German, Norman, and Anglo-Norman law are reckoned important. He was the first to demonstrate the influence exercised by the primitive legal institutions of the Franks through the Normans upon the English system of trial by jury. Among the titles of his works are: *Zeugen-und Inquisitionsbeweis der karolingischen Zeit* (1866), and *Die Entstehung der Schwurgerichte* (1872).

BRUNNER, brōō'nĕr, SEBASTIAN (1814-93). An Austrian Roman Catholic theologian and author. He was born in Vienna, studied there, was ordained priest in 1838. In 1848 he founded the *Wiener katholische Kirchenzeitung*, which he edited until 1865, and from 1853 to 1857 he was university preacher in Vienna. In 1865 he became apostolic prothonotary and prelate of the Papal household. In his writings he was didactic, militant, and voluminous. Among his Ultramontane polemics are a satire in verse, *Der Nebeljungen Lied* (1845; 4th ed., 1891), directed against the Hegelians, and *Der deutsche Hiob* (2d ed., 1846). His *Gesammelte Erzählungen und poetische Schriften* appeared in 1864-77. For his biography, consult Scheicher (Vienna, 1888).

BRUNNER'S GLANDS (after J. C. Brunner, German anatomist). Small glands of the compound tubular variety (see GLANDS) lying in the submucous coat of the duodenum. The tubular acini are lined with granular epithelium, which secretes a serous fluid. The ducts pierce the muscularis mucosæ and open upon the surface of the mucous membrane between the villi.

BRÜNNOW, brŭn'nō, PHILIPP Count (1797-1875). A Russian diplomat, born in Dresden. He studied at the University of Leipzig, and entered the diplomatic service in 1818. He took part in the congresses of Troppau and Laibach, acted for one year as secretary to the Russian Embassy in London, attended the Congress of Verona, and then occupied for a time a high office in Saint Petersburg. In 1840 he was accredited ambassador to London. After the outbreak of the Crimean War he represented Russia in Frankfort, and, with Count Orloff, was sent to the

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Congress of Paris in 1856. Immediately after the treaty of peace had been concluded, he was sent on a special mission to London to reëstablish friendly relations between the courts of Saint Petersburg and Saint James. He was afterwards appointed to the Court of Prussia, but in 1858 he returned to his old place in London. He represented Russia at the conferences in London in 1864 and 1871. In recognition of his services he was made a count by the Czar in April, 1871. In 1874 he retired to Darmstadt, where he died in the following year.

BRUNO, brōō'nō, FILIPPO GIORDANO (1548-1600). An Italian philosopher. He was born at Nola (hence often called 'the Nolan'), in the Kingdom of Naples, and entered at an early age the Order of Dominicans; but later, when he expressed doubts in regard to some Church doctrines, he was obliged to flee from his convent (1576). Henceforth his life was unsettled by reason of the theological and philosophical hostility he aroused wherever he stayed. He first went to Geneva, where he spent two years, then to Venice, Padua, Brescia, Milan, Genoa, Toulouse, Paris, London, Oxford, Marburg, Wittenberg, Prague, Helmstedt, Frankfort-on-the-Main, Zurich, Padua, and back to Venice. In many of these places he occupied professorial chairs or delivered courses of lectures, as in Toulouse, Paris, Oxford, Wittenberg, and Helmstedt. It was in England, under the protection of the French Ambassador, and in the enjoyment of the friendship of Sir Philip Sidney, that he composed his most important works (1583-85). In Venice, in 1592, he was arrested by officers of the Inquisition, and conveyed to Rome in 1593. He was now subjected for seven years to persecution and imprisonment, in the vain hope that he would recant; but when all the endeavors of his enemies proved ineffectual, he was given over to the civil authorities with the despicably hypocritical request that he 'be punished as lightly as possible, and without bloodshed.' He told his judges that probably they feared the sentence they pronounced more than he. He died at the stake, February 17, 1600. In 1889, under Papal protest, a monument was erected on the spot where he had suffered martyrdom. His writings, of which the most valuable are composed in Italian, display throughout a strong, courageous soul, susceptible of deep enthusiasm, and laboring to attain to the truth. *La Cena delle ceneri*, or, "Evening Conversations on Ash Wednesday," is an apology for the Copernican astronomy; the *Spaccio della bestia trionfante*, or, "Expulsion of the Triumphant Beast" (Paris, 1584), is a satirical allegory in the style of the times.

His greatest works are metaphysical, such as the *Della causa principio ed uno* ("On the One First Cause") and *De l'infinito universo e mondi* ("On the Infinity of the Universe and of Worlds"). The doctrine enunciated in these is pantheistic, and was perhaps inspired by that of Nicolas of Cusa (q.v.), who was himself decidedly Neo-Platonistic. Bruno held that there is no form without matter, and as spirit or soul is form, it can exist only in material embodiment. There is an all-life, animating the whole universe, which is thus one living being with life in all its members. This all-life is God, also called *natura naturans*, who manifests himself in the visible world, or *natura naturata*. In God all the seeming inconsistencies of the sensible world are harmonized (*coincidentia oppositorum*). This thought of the oneness of the universe led Bruno to expand the Copernican view of astronomy, which in its founder's thought regarded only the solar system, and to make it take in all creation, which is thus regarded as a system of innumerable worlds, each with its own sun, each having developed out of a primitive indefiniteness to its present form, and each destined to decay and dissolve. Every part of this universe is instinct with the life of the whole. The ultimate irreducible parts are called monads, which are eternal, both spiritual and corporeal; and they are atoms, subject to mathematical laws on the corporeal side.

In logic Bruno was an opponent of the Aristotelian theory, as interpreted by the scholastics, and was an ardent champion of 'the Lullian art' (see LULLY, RAYMOND), which he greatly improved. He rejected the syllogism as yielding no new truth, and emphasized the necessity of studying things rather than analyzing conceptions.

Bruno's philosophy had a great influence on subsequent thinkers. Descartes, Spinoza, Leibnitz, Böhme, Hegel, and many others were much indebted to him. Original editions of Bruno's works are very rare. His writings in Italian were published by Wagner (Leipzig, 1829). All his Latin writings were published in Naples and Florence (1880-89). Consult: Bartholomèss, *Jordano Bruno* (Paris, 1846); Frith, *Life of Bruno the Nolan* (London, 1887); Berti, *Documenti intorno a Giordano Bruno di Nola* (Rome, 1880); Sigwart, *Die Lebensgeschichte Giordano Brunos* (Tübingen, 1880); Mariano, *Giordano Bruno: La vita e l'uomo* (Rome, 1881); Brunhofer, *Giordano Bruno's Weltanschauung und Verhängnis* (Leipzig, 1882); and a luminous treatment in Pater, *Gaston de Latour* (London, 1896).

BRUNO, SAINT (1030-1101). The founder of the Carthusian order of monks. He was born in Cologne, and received his earliest education in the school attached to the Collegiate Church of Saint Cunibert, in that city. Subsequently he studied in Rheims, where he distinguished himself so greatly that Bishop Gervasius appointed him in 1057 director of all the schools in his diocese. Bruno, however, soon began to be troubled by the wickedness of his time, and, anxious to escape from what seemed to him the general pollution, he took refuge, along with six pious friends, in a desert place, 14 miles north of Grenoble, and there, in 1084, founded the Order of the Carthusians (q.v.), so called from the monastery, now known as La Grande Chartreuse. The present building was erected after the last fire in 1676. Bruno and his companions had each a separate cell, in which they practiced the severities of the rule of Saint Benedict, keeping silence during six days of the week, and only seeing one another on Sundays. Pope Urban II., who was one of Bruno's most eminent scholars, in 1090 summoned the saint to Rome to be his adviser. Bruno obeyed the call reluctantly, and steadily refused all offers of preferment. He was the companion of Urban in his flight to the Campagna from the threatened onslaught of the Emperor Henry IV., and shortly after (1094) established a second Carthusian monastery, called La Torre, in a solitary district of Calabria, not far from Squillace, on the bay of the same name, and there died, October 6, 1101. He was

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canonized by Leo X. in 1514. Bruno left no written regulations for his followers. These first made their appearance in a complete form in 1581, and were enjoined on all Carthusians by Pope Innocent IX. Consult: Tappert, *Life of Bruno* (Luxemburg, 1872); another appeared at Montreuil-sur-Mer (1898).

BRUNO THE GREAT (c.925-965). Archbishop of Cologne, and Duke of Lorraine, one of the most eminent men of his time. He was the third son of Henry the Fowler, and the brother of Otho I., Emperor of Germany. Balderich, Bishop of Utrecht, was his instructor, and at an early age he became noted for surprising knowledge, sagacity, and eloquence which secured for him an immense influence over the bishops and clergy. On the other hand, his liberality, meekness, and great earnestness of heart won the affections and reverence of the laity. Summoned by Otho to the Imperial palace in 939, he quickly assumed an influential position among the choniclers, poets, and philosophers of the Court. In 940 he became Imperial Chancellor. He accompanied Otho to Italy in 951, and honorably distinguished himself by his fidelity to his brother, when Otho's own son, Conrad, and others of his kindred rebelled against him. As a reward, the Emperor appointed him Archbishop of Cologne and Duke of Lorraine, in 953. Bruno died at Rheims, October 11, 965. He wrote a commentary on the Pentateuch, and several lives of saints. For his life, consult F. I. Pieler, *Gymnasial Program* (Arnsberg, 1851).

BRUNONIAN SYSTEM OF MEDICINE. See BROWN, JOHN.

BRUNS, brōōns, Ivo (1853—). A German classical philologist and professor in the University of Kiel. He was born in Halle, May 20, 1853, and is the author of *Plato's Gesetze*, etc. (1880); *Lucrezstudien* (1884); *Litterarische Porträte der Griechen* (1896); *Persönlichkeit in der Geschichtschreibung der Alten* (1898), etc.

BRUNS, KARL GEORG (1816-80). A German jurist. He was born in Helmstedt, and studied in Göttingen, Heidelberg, and Tübingen. He was professor of law at the University of Berlin from 1861 to 1880. Several of his works on jurisprudence are justly celebrated. They include: *Das Recht des Besitzes im Mittelalter und in der Gegenwart* (1848)—a work worthy of being ranked with that of Savigny; and *Fontes Juris Romani Antiqui* (6th ed., edited by Mommsen and Gradenwitz, 1893).

BRUNS, VICTOR VON (1812-83). A German surgeon, born in Helmstedt. He studied in Brunswick, Tübingen, Halle, and Berlin, and after practicing in Brunswick visited Vienna and Paris, to perfect himself in the science of surgery. In 1843 he accepted the position of professor of surgery at Tübingen. In 1855 he was ennobled. He wrote numerous scientific treatises, and was an authority on diseases of the larynx, winning the medical prize of 20,000 marks offered by the Academy of Turin with his work on the surgical treatment of the larynx. Among his publications are: *Die Durchschneidung der Gesichtsnerven beim Gesichtsschmerz* (Tübingen, 1859); *Die Laryngoskopie und laryngoskopische Chirurgie* (Tübingen, 1865); *Die Amputation der Gliedmassen durch, Zirkelschnitt mit vorderm Hautlappen* (Tübingen, 1879).

BRUNSWICK, brŭnz'wĭk. A city, port of entry, and county-seat of Glynn County, Ga., 30 miles south by west of Savannah, on Saint Simon's Sound, 8 miles from the ocean, and on the Seaboard Air Line, the Plant System, and the Southern railroads (Map: Georgia, E 4). It is connected also by steamships with New York and Boston, as well as other points on the coast; has a fine harbor, with a lighthouse over 100 feet high; and exports cotton, phosphates, tar, rosin, turpentine, cross-ties, and pine lumber. Truck-gardening and oyster and vegetable canning are important industries. Brunswick is popular as a summer and winter resort, and has many points of interest, among the more prominent of which are the United States Government building, the city hall, Oglethorpe Hotel, Jekyl Island Club (the 'Millionaire's resort'), the historic Saint Simon's Island, Cumberland Island, the burial-place of 'Light Horse Harry' Lee, the site of Dungeness Castle of the Carnegies, and the Shell Boulevard, 9 miles in length. Under a revised charter of 1900, the government is vested in a mayor, elected every two years, and a municipal council, chosen on a general ticket, which embraces all subordinate officials. Brunswick was settled as early as 1735 by James Oglethorpe (q.v.). Population, in 1890, 8459; in 1900, 9081.

BRUNSWICK. A town in Cumberland County, Maine, including Brunswick Village, at the head of navigation on the Androscoggin River, and on the Maine Central Railroad (Map: Maine, C 8). It is 9 miles west of Bath, and opposite Topsham, with which it is connected by bridges. Good water-power is afforded by the falls of the river at the head of tidal waters. The town manufactures cotton goods, pulp, flour, canned goods, boxes, brass, steel, and wooden specialties, patent medicines, etc. It has a public library of over 9000 volumes, and is the seat of Bowdoin College (q.v.) and the Medical School of Maine. Brunswick was settled in 1628, and originally was called Pejepscot. The town of Brunswick was incorporated in 1717, and the village in 1836. Population, in 1890, 6012; in 1900, 6806. Consult Wheeler, *History of Brunswick, Topsham, and Harpswell, Including the Ancient Territory Known as Pejepscot* (Boston, 1878).

BRUNSWICK, DUKE OF. See CHARLES, FRIEDRICH AUGUST WILHELM.

BRUNSWICK, HOUSE OF. Henry the Lion, of the House of Guelph, one of the great vassals of Frederick Barbarossa in the Twelfth Century, was the founder of this house. He held the old Saxon duchy and Bavaria, but lost all save his allodial possessions, Brunswick and Lüneburg, through his rebellious conduct. His son Otho was German Emperor as Otho IV. Otho the Child, a grandson of Henry the Lion, was recognized as the first Duke of Brunswick in 1235. The history of the House of Brunswick in the course of the next four centuries presents a bewildering succession of divisions, reunions, and ramifications. Ernst the Confessor, Duke of Lüneburg, who lived at the time of the Reformation, and who introduced Protestantism into his little State, may be regarded as the progenitor, through his grandson Augustus, of the modern elder ducal line of Brunswick (Brunswick-Wolfenbüttel) which became extinct in 1884, and, through his son William, of the new younger

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ducal line of Brunswick-Lüneburg (House of Hanover). Ernst Augustus, Duke of Brunswick-Lüneburg, who married Sophia, a granddaughter of James I. of England, was raised to the dignity of ninth Elector of the Empire in 1692. His son, George Louis, succeeded to the crown of Great Britain in 1714. (See ENGLAND and HANOVER.) The ducal residence, which had been at Wolfenbüttel, was in 1754 removed to Brunswick by Duke Charles, who founded the famous Collegium Carolinum, and was a faithful ally of England during the Seven Years' War. He died in 1780. His brother Ferdinand was the ablest of the lieutenants of Frederick the Great, turned the tide of battle at Prague, and won the battles of Crefeld and Minden. The son and successor of Duke Charles, Charles William Ferdinand, was nephew of Frederick the Great, and married Augusta, daughter of George III. of England. He fought in the Seven Years' War, and played an important part at the battle of Crefeld in 1758. In 1792 he was commander of the allied armies of Austria and Prussia against France. He marched into Champagne, but was compelled to conclude an armistice with Dumouriez, after trying in vain to force the position at Valmy. In 1806 he was called to lead the Prussian troops against Napoleon, who defeated him decisively at Auerstädt; he retired, broken-hearted, and died soon afterwords from the effects of his wounds. Napoleon incorporated his duchy with the new Kingdom of Westphalia, but after the battle of Leipzig it was restored to his son, Frederick William, who had distinguished himself in the campaigns of 1792, 1793, 1806, and who fell at the head of his troops at the battle of Quatre-Bras in 1815. His son, Charles Frederick, was a minor, and up to 1823 George IV. of England acted as Prince Regent. The people of Brunswick endured the misrule of Charles Frederick for seven years; then they revolted and drove him from his duchy in 1830. He died childless in Geneva, in 1873. By an act of the Germanic Diet the duchy was transferred to his brother William, Prince of Oels (born in 1806), who assumed the government April 25, 1831. He died childless in 1884, and the succession passed to the Duke of Cumberland, son of George V., the dethroned King of Hanover. As the heir refused to recognize the new Constitution of the German Empire, the Imperial Government declined to allow the succession to take place, and an interregnum occurred. In October, 1885, Prince Albert, a nephew of the Emperor William I., was elected Regent of the duchy by the Diet. Consult: Halliday, *Annals of the House of Hanover* (London, 1826); Fitzmaurice, *Charles William Ferdinand, Duke of Brunswick: An Historical Study* (London, 1901); Heinemann, *Geschichte von Braunschweig und Hanover* (Gotha, 1882-92).

BRUNSWICK (Ger. *Braunschweig*). A duchy in the north of Germany, composed of three large and six small exclaves. It is bounded mainly by Prussian territory (provinces of Hanover, Saxony, and Westphalia), with a total area of 1424 square miles (Map: Germany, D 2). The southeast part belongs to the region of the Harz Mountains, and rises in some places over 3000 feet. The northern portion is only slightly elevated, and is mainly hilly. Brunswick belongs almost entirely to the basin of the Weser. The soil is mostly well cultivated and productive, due in great part to the division of the land into very small holdings.

Agriculture is the leading occupation; over 50 per cent. of the total area is under tillage. Wheat, rye, oats, and barley are the chief cereals grown, and potatoes, sugar-beets, and hay are important crops. Vegetables are cultivated extensively, and fruit-culture has developed rapidly under the encouragement of the State. Cattle-raising is carried on only in connection with agriculture, but the live-stock returns of the duchy for the last few years show a very large increase. The mineral industries are important. Lignite, iron, asphalt, lead, and copper are the principal minerals, and the total annual output is about 25,000,000 marks ($6,000,000).

The manufactures of Brunswick are diversified. There are extensive sugar mills and refineries, cigar and cigarette factories, hat-factories, machine-shops, chemical-works of different kinds, glass-works, some weaving-mills, and a number of breweries. The main domestic exports are metals, textiles, hats, liquors, and building-stone. There are over 300 miles of railway lines. They belong largely to the Prussian State Railway system.

The Constitutional Government dates from 1830, although the Constitution was not adopted until 1832. As amended in 1899, it provides for one Chamber, composed of 15 members elected by the towns, 15 by the rural communities, 2 by the Protestant clergy, 4 by the landed aristocracy, 3 by the manufacturing interests, 4 by the professional classes, and 5 by the highest-taxed citizens. Members of the Chamber serve for four years. It is summoned every two years. Brunswick has 2 votes in the Bundesrat and 3 representatives in the Reichstag. The highest executive body is the Staatsministerium, divided into 5 departments. For purposes of local administration Brunswick is divided into 6 circles, administered by directors. Revenue is obtained chiefly by taxation and by the exploitation of State domains. The budget is made up for a period of two years, the estimates for education not being embraced in the general budget. For 1901-02 the budget balanced, the totals being 17,000,000 marks (nearly $4,000,000), excluding the civil list of the Duke, 1,125,000 marks ($267,750). The public debt, not reckoning the premium loan contracted in 1869, and payable in annual instalments by 1924, amounted in 1900 to 27,688,000 marks ($6,589,744), and was contracted principally for railways.

Education is in the hands of a special commission. The technological school in Brunswick, however, is under the immediate charge of the Ministry. There are about 415 elementary schools, mostly in the rural districts, and a considerable number of secondary and trade schools. The military forces of Brunswick are now combined with those of Prussia, but are controlled to some extent by the Regent. In 1900 the population—almost exclusively native and Protestant—was 464,251, showing 6.9 per cent. increase since the census of 1895. The capital is Brunswick (q.v.). For the history of the duchy, see BRUNSWICK, HOUSE OF.

BRUNSWICK (Ger. *Braunschweig*, mediæval *Brunswich*, *Bruneswik*, for Med. Lat. *Brunonis vicus*, the village of Bruno, son of Rudolf, Duke of Saxony; cf. Engl. *wick*, AS. *wic*, town, MHG. *wich*, Goth. *weihs*, village). The capital

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of the German duchy of the same name, situated on the Oker, about 35 miles southeast of Hanover, and in latitude 52° 16′ N., and longitude 10° 32′ E. (Map: Germany, D 2). The town is irregularly built, and its crooked and narrow streets lend it a mediæval appearance, although its fortifications have given way to parks and promenades. The most noteworthy of the churches are the cathedral, founded by Henry the Lion in the Twelfth Century, and containing the tombs of Henry and his wife; the Church of Saint Catharine, begun by him in the Twelfth Century, and completed in the Fifteenth; and the Church of Saint Magnus, the original of which was built in the Eleventh Century. Among the secular edifices, the most prominent is the Ducal Palace, erected in 1831-36 on the site of the Graue Hof, and reconstructed after the fire of 1865. It has an imposing façade, surmounted by a fine quadriga in copper, and is adorned with statues of Otho IV. and Otho the Child. The Altstadt Rathaus (town-hall of the old town) is a fine Gothic building, begun in 1250 and completed in 1468. Its façade, having open arcades and pillars, is adorned with the statues of Saxon princes. Among other interesting edifices are the old castle, recently rebuilt, and the beautiful Gewandhaus. Brunswick is rich in monuments, including one to Lessing.

The chief industries comprise the manufacturing of chicory, tobacco, woolens, paint, machines, chemicals, articles of apparel, sugar, liquors, etc. The commerce is considerable, but it has declined of late, and the annual fairs have lost in importance.

The city administration is carried on by a municipal council of 36 members and an executive board of 8 members. Brunswick owns its water-works, gas plant, a slaughter-house, and markets. A municipal sewage farm has been in operation since 1897. The city is well provided with educational institutions, among which are a technical high school established in 1745, and several special schools and teachers' seminaries. The Ducal Musuem contains fine Dutch paintings and etchings. There are also a municipal museum and a theatre. Population, in 1890, 101,047; in 1900, 128,177. Most of the inhabitants are Lutherans.

Brunswick is supposed to have been founded in the second half of the Ninth Century. It obtained municipal privileges from Henry the Lion, by whom it was also strongly fortified. A member of the Hanseatic League, Brunswick became one of the most important cities of Northern Germany; but its prosperity did not outlive that of the League. In the Seventeenth Century began a decline, to which the Thirty Years' War also contributed. During 1806-13 Brunswick belonged to the Kingdom of Westphalia. In 1830 it was the scene of a revolution, which resulted in the flight of the reigning Duke.

BRUNSWICK BLACK. A varnish employed for coating coarsely finished iron grates, fen rs, etc. It is mainly compounded of bitumen, lampblack, and turpentine, and when applied with a brush, quickly dries, and leaves a shining jet-black surface. A similar composition of finer quality for finer work is known as Berlin black.

BRUNSWICK GREEN. A name applied to several different substances. It has been used, in the first place, to denote a green pigment obtained by heating, in a closed vessel, a solution of ammonium chloride with copper filings, separating the resulting pigment from metallic copper by washing, and then slowly drying it. As thus obtained, the pigment is a copper oxychloride, essentially similar to the mineral *atacamite*, which was originally found in Chile. Another use of the name is to denote the pigment precipitated by the addition of ammonium carbonate to a solution of alum and copper sulphate. Lighter shades of this pigment may be produced by adding barium sulphate or alum. At present, however, the name Brunswick green is generally applied to mixtures of Prussian blue and chrome-yellow.

BRUSA, brōō'sà, or **BROUSSA** (anciently, Lat. *Prusa*). A town of Asiatic Turkey, the capital of the vilayet of the same name, situated at the foot of Mount Olympus, about 20 miles from the Sea of Marmora (Map: Turkey in Asia, C 2). The town is divided into several parts by a mountain stream, spanned by a number of bridges. It has an old ruined castle in the centre, and while its streets are not very wide or straight, the town has a very neat and picturesque appearance. Mosques are numerous, and some of them—as e.g. the Oglu-Djami—possess architectural beauty. There are also a number of fine baths, khans, and bazaars, which are well stocked with European goods imported from Constantinople. In Brusa and its vicinity are the tombs of several of the early sultans and of a large number of Turkish notabilities. About a mile west of the town are found four hot sulphur springs used for bathing. The industrial importance of Brusa is considerable. It produces silk goods and garments of a very high reputation in the Eastern markets, exported also to Lyons. The port of Brusa is Mudania, with which it is connected by a railway line about 20 miles long. Brusa had once a population of 100,000, which has dwindled at present to about 40,000, mostly Turks.

Brusa was built by Prusias II., King of Bithynia. In 1326 Orkhan, son of Othman, the second Sultan of Turkey, captured it and made it the capital of his empire, and it continued so until the Sultan Amurath I., the successor of Orkhan, removed the capital to Adrianople. The Tartars plundered it in 1402. It has suffered much from fire and earthquakes. Consult Wilson, *Constantinople, Brusa, and the Troad* (London, 1893).

BRUSASORCI, brōō'sà-sôr'chê. See RICCIO, DOMENICO.

BRUSH. This term is used in electricity, first, to describe a particular form of discharge from an electrical machine (q.v.), and, second, as the name of the device by which contact is established between the commutator, or other revolving part of a dynamo or motor, and the conductors leading to the line. The brush discharge from a static machine takes place when the machine is in operation, but no sparks are drawn from the collector, and is in the form of a brush of pale-blue light, visible in a darkened room, and accompanied by a faint hissing or crackling. It occurs at the brass ball which is farthest distant from the collecting comb, and appears very similar to a tree with its branches and ramifications. The shape of the brush

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varies with the shape of the conductor, where the discharge takes place and has been examined by means of revolving mirrors (see CHRONOSCOPE) and found to consist of a series of partial sparks. In the case of a dynamo or motor the brushes are either bundles of strips of copper or gauze or blocks of carbon, which press against the commutator or collecting rings and complete the circuit through the line. They will be found described and illustrated in the article DYNAMO-ELECTRIC MACHINERY.

BRUSH, CHARLES FRANCIS (1849—). An American inventor, born in Euclid, Ohio. He graduated in 1869, at the engineering department of the University of Michigan, and was an analytical chemist in Cleveland, Ohio, from 1869 to 1871. From 1871 to 1875 he was in the iron industry. He perfected in 1876 the dynamo-electric machine known by his name, and not long after the 'series' arc-lamp, which might, with uniform results, be used in circuit in large numbers. Since that time he has patented more than fifty other inventions, chiefly detailed improvements on the two preceding. He founded in Cleveland the Brush Electric Company, which controls all his American patents, and in 1899 received the Rumford medal.

BRUSH, EDWARD N. (1852—). An American physician. He was born at Glenwood, Erie County, N. Y.; graduated in 1874 at the University of Buffalo; was editor of the *Buffalo Medical Journal* in 1874-89, and assistant physician at the State Lunatic Asylum, Utica. From 1884 to 1891 he was assistant at the Pennsylvania Hospital for the Insane, Philadelphia, and in the latter year became physician-in-chief and medical superintendent of the Sheppard and Enoch Pratt Hospital, Baltimore, Md. He was associate editor of the *American Journal of Insanity* from 1878 to 1884, and again assumed that post in 1897. He has written much on insanity.

BRUSH GEORGE DE FOREST (1855—). An American figure-painter. He was born in Shelbyville, Tenn., September 28, 1855, and was a pupil of Gérôme in Paris. Public notice was first attracted to his work, in 1883, by his pictures of Indian life in the West. In 1892 he exhibited at the Society of American Artists "The Portrait" and "Ossian and the Bard." After his later visits to Paris his work was more strictly confined to figure-composition, portraying mother and child, or children, in somewhat the manner of the Italian Renaissance painters. He interested himself in plastic art, with a view to improving works of handicraft in general use. Brush took the Hallgarten prize of the National Academy in 1888, and received a gold medal at the Paris Exposition of 1900. He was chosen a member of the Society of American Artists, and an associate of the National Academy of Design. His color sense is strong, and his canvases are composed with great care. His work seems little affected by the new school of light and air, but remains faithful to the older traditions of 'seeing' and of the manipulation of pigment.

BRUSH, GEORGE JARVIS (1831—). An American mineralogist, born in Brooklyn, N. Y. He graduated at Yale in 1852, and later studied in Munich and Freiberg. In 1855 he became professor of metallurgy in the Yale, now Sheffield, Scientific School, exchanging this chair for that of mineralogy in 1864. He was director of the scientific school from 1872 to 1898. He has contributed much to the *American Journal of Science* and similar periodicals, and has published a *Manual of Determinative Mineralogy* (1875).

BRUSH-BIRDS. The Australian scrub-birds (q.v.).

BRUSH and **BROOM** (*brush*, OF. *broche*, *brosse*, bush, brushwood, possibly akin to AS. *byrst*, OHG. *burst*, Ger. *Borst*, bristle; and see BROOM). A brush is an instrument for sweeping or rubbing surfaces, either to remove dirt or to apply some material, as paint or blacking. It is composed of a bunch or bunches of fibrous and flexible material attached to a handle or back. A broom is simply a long-handled brush. These familiar instruments are of very ancient origin, for they are mentioned in the writings of Homer. They are used for a great variety of purposes, and are made from an indefinite number of materials. Among the commoner materials used in their manufacture are bristles, feathers, whalebone, and rubber, the hair of the camel, Russian squirrel, badger, bear, and goat, rattan, split cane, broom-corn, and coir. The last-named material, which is simply the husk of the cocoanut-palm, is largely superseding hog's bristles for the coarser kinds of brushes.

Brushes are said to be simple when they consist of a single tuft, and compound when they consist of a series of tufts. The crudest form of all is the ordinary paint-brush, in which the handle is forked at the end and a bunch of bristles is inserted between the two prongs, which are then bound together with twine and secured with a coating of glue. Artists' paint-brushes are made from camel's or Russian squirrel's hair; the roots are forced into a quill which has been soaked previously, and which on drying holds them fast.

In making the cheaper grades of compound brushes, such as floor and scrub brushes, dusters and blacking-brushes, the tufts of bristles, coir, or whatever the material used, are simply stuck into holes bored in a piece of wood. These holes may be bored at an angle, so that the tufts will project outward. The root-ends are dipped in melted pitch, bound with thread, and then dipped again and inserted with a twisting motion. In the finer grades of brushes the tufts are tied in the middle with wire or thread, which is drawn up through the hole piercing the wood, and are secured by interweaving at the back. A veneer is then glued or cemented on the back to cover the wires. The best brushes are trepanned—that is, the holes are driven longitudinally or transversely through the back, and other holes sunk to meet them on the face of the brush. The tufts are then tied in the middle with strong threads, which are drawn through the holes piercing the brush, after which the holes running transversely or longitudinally through the brush are plugged. Brushes are made by machinery, and many different devices for their construction have been invented. In the Woodbury process—an American invention and one of the earliest in brush manufacture — the back of the brush is trepanned, and as the holes do not go clear through the wood, an extra back is not required. This machine consists essentially of a metal comb

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of uniform thickness, filled with bristles which are held in the middle, so that one half of the bristles appear above the surface of the comb and the other half beneath. The comb thus charged moves in guideways, and discharges bristles from each division successively into a channel in which they are brought into a horizontal position, and a proper quantity taken up to form a tuft. This tuft is moved along an inclined cylinder, when a plunger doubles the bristles into a loop, which is seized by wire, and in an instant securely fastened.

Brooms for sweeping floors, and whisk brooms for brushing clothes, are produced in large quantities in the United States, where they are made from broom-corn, a staple agricultural product of the Middle West. Broom-corn growing and broom-making are both carried on in a small way by hundreds of farmers and manufacturers, and the bulk of the work is still done by hand, or with the aid of simple machinery. Large manufacturers, however, employ steam sewing-machines. The broom-corn or brush is received at the shop in bales. It is first run through sizing-machines, to separate the fibres into groups according to length. In the large shops the broom is tied into bundles and bleached or dried to give it the desired color. The broom-handles are essentially simply turned sticks, which are sandpapered, varnished, painted, or otherwise finished to suit the trade. Whisk brooms, however, often have fancy handles of bone, celluloid, or even such costly materials as silver and ivory. In making the broom the fibres are placed around the end of the stick or handle and secured by wire in a simple winding-machine. The broom at this point is conical. The next step is to flatten it to shape in a vise, and secure it in that form by sewing it with twine. This may be done by hand or by power; in either case the broom is held in a vise while being sewed. To remove the portion of seed left on the broom by the harvester, it is run through a scraping-machine, between rolls or cylinders containing pegs or wires. The brooms are then trimmed; tin, plush, or velvet guards are placed over the wiring; labels are affixed, and the completed brooms bunched in dozens. In the cheaper grades of brooms the sticks are plain and the guards are omitted. Besides brooms, many other varieties of brushes are made from the broom-corn.

Revolving brooms, for sweeping streets, began to be used as early as 1835. The modern carpet-sweeper (q.v.) is a form of revolving broom. Besides the commoner types of brushes and brooms already described, there is an endless variety constructed in special shapes and used for special purposes.

The accompanying table gives the foreign trade of the United States in brushes and brush-materials:

VALUE OF FOREIGN TRADE OF THE UNITED STATES IN BRUSHES AND BRUSH MATERIALS
COMPILED FROM THE STATISTICAL ABSTRACT FOR 1900

YEAR ENDING JUNE 30TH	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900
IMPORTED										
Crude Bristles	.....	.....	.....	.....	$1,892	$1,620	$385	$416	$12,399	$22,39[illegible]
Prepared Bristles *	$1,357,938	$1,455,058	$1,508,258	$929,231	1,242,259	1,433,728	1,216,794	1,248,703	1,445,853	2,130,5[illegible]
Brushes	863,573	797,879	814,062	559,767	660,585	753,928	782,802	745,267	890,629	977,51[illegible]
EXPORTED										
Broom-Corn	$172,191	$218,133	$163,105	$210,742	$169,503	$181,853	$136,007	$163,066	$185,902	$182,[illegible]
Brooms & Brushes	150,609	181,110	241,343	179,098	165,672	180,183	186,056	158,272	211,931	232,8[illegible]

* Includes "bristles of all kinds prior to 1895."

BRUSH-TURKEY (so called because it lives in brush or scrub). An Australian bird (*Tallegala Lathami*), one of the largest and best-known of megapodes. See MOUND-BIRD.

BRUS'SELS (Fr. *Bruxelles*, Med. Lat. *Brosella*, later *Bruocsella*, *Bruxella*, from MHG. *bruoch*, Ger. *Bruch*, marsh, bog, AS. *brōc*, stream, Engl. *brook* + Lat. *sella*, seat, Bruocsella having been the residence of the Duke of Lotharingia, or Lorraine, in a marshy locality). The capital of Belgium, as well as of the Province of Brabant, situated in the centre of the country, on the river Senne (Map: Belgium, C 4). Due to its uneven site, the city is divided into the upper and the lower towns. The former is the fashionable part of the city, and is essentially modern in its appearance, the French language being chiefly spoken; the latter town, devoted mainly to business, still retains some of the original Flemish picturesqueness, together with the Flemish tongue. The municipal authorities are as deeply concerned with the artistic aspect of the capital as with the acquisition and control of the municipal works. As a result, Brussels, with its magnificent parks, well-shaded boulevards, and splendid squares, is considered one of the finest cities in Europe, and justly deserves the name 'Petit Paris.' It was formerly surrounded by strong walls, which have been converted into broad avenues and pleasure-grounds. The Allée Verte—a double street along the Scheldt Canal—forms a splendid promenade, and leads toward the Palace of Laeken, the suburban residence of the royal family, 3 miles north of the city. Besides these outer boulevards, which encircle the city, are several inner boulevards, recently constructed at a considerable expense. In the upper town the most magnificent park is near the royal palace. Of the city squares, the most noteworthy are the Place Royale, with its colossal monument of Godfrey of Bouillon; the Grande Place, in which is the Hôtel de Ville, where in 1568 the patriot counts, Egmont and Horn, were beheaded by order of the Duke of Alba; the Place des Martyrs, with a memorial erected to those who fell here in the Revolution of 1830; the Place du Grand Sablon, with its adjacent Place du Petit Sablon, orna-

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mented by an inclosure containing several statues of scientists and authors; the Place du Congrès, having a column 146 feet high, surmounted by a bronze statue of King Leopold I.; and the Place Sainte Gudule, containing the famous cathedral of the same name.

Among the ecclesiastical buildings, the Cathedral of Sainte Gudule ranks first. It is an imposing structure in early Gothic style, begun about 1220, on the site of an old church. It is famous chiefly for its magnificent windows of stained glass, belonging to different periods since the Thirteenth Century. The two towers on both sides and the statuettes of the portal are of a recent date. The cathedral contains numerous monuments of the royal family. Notre Dame des Victoires or du Sablon was originally constructed in the early Fourteenth Century, was completely rebuilt in the Fifteenth and Sixteenth centuries, and is now being restored. Other prominent churches are Notre Dame de Finistère and Saint Jacques sur Caudenberg, with a copper-roofed belfry. The finest specimens of architecture, however, are found in the secular edifices of Brussels, among which the Hôtel de Ville comes first. It is in the Gothic style, and its façade, fronting the market, is profusely adorned with statuary. In the centre rises the tower, 370 feet, surmounted by a gilt statue of Saint Michael, the city's patron saint. The front part of the building dates from the Fifteenth Century; the rear portion was reconstructed in the Eighteenth Century, after the French had destroyed the original structure in 1695. The royal palace stands south of the park, and contains pictures by Rubens, Vandyke, and Frans Hals. On the north side of the park is situated the Palais de la Nation, erected at the close of the Eighteenth Century for the Council of Brabant. It is now used by the Senate and the Chamber of Deputies. The Palais des Académies, formerly belonging to the Prince of Orange, is in the Italian style, and houses the Académie Royale des Lettres, Beaux-Arts et Sciences, and the Académie Royale de Médecine. The Palais d'Arenberg dates from the Sixteenth Century, and has a picture-gallery containing examples of Rubens, Vandyke, Rembrandt, Teniers, and Frans Hals. The largest structure of modern times is the Palais de Justice, begun in 1866 and inaugurated in 1883, on the occasion of the fiftieth anniversary of Belgium's independence. It is in the Græco-Roman style, and covers a site of 590 feet by 560. Pyramidal in shape, it culminates in a dome with a cross. Brussels has a number of markets, and the Place Grande contains several guild-houses devoted to the use of various trades.

Administration. The capital is administered by a burgomaster, assisted by five assessors. The municipal council has twenty-nine members, elected for six years. Brussels owns its telephone lines, electric plant, water and gas works, all of which it operates at a considerable profit; while by the sale of the city's garbage one-fourth of the cost of its collection is recovered. The street railways, run by electricity, are owned by private companies, which, however, are under the strict control of the municipal government. The sanitary conditions of the city are being constantly improved, and the death-rate shows a satisfactory decline. The annual budget of Brussels is steadily growing, and in 1901 reached the sum of over 43,000,000 francs (about $8,300,000), of which sum about 25 per cent. was required by the needs of the municipal debt. The cost of the administration amounts to a little over 3 per cent., an amount nearly equal to the profits from the municipal gas plant. The municipal debts of Brussels were consolidated in 1886 into a single debt of 289,000,000 francs ($55,777,000), payable in 90 years.

Education. Among the numerous educational establishments, the university (q.v.), with its splendid library, stands first. There are also an academy of medicine, a veterinary school, a military school, a conservatory of music, numerous scientific and art associations, and an academy of art. The Royal Library, founded in 1838, has 375,000 volumes, about 25,000 manuscripts, 100,000 engravings and prints, and a vast collection of coins and medals. The Palais des Beaux-Arts is a classical building, completed in 1880, and devoted mainly to paintings and sculpture. It contains about 600 paintings of the old Flemish school, and a gallery of modern Flemish art numbering about 350 canvases. Among the theatres the most important is the Théâtre de la Monnaie, built in the beginning of the Sixteenth Century and devoted to opera.

In industry and commerce Brussels occupies a secondary position. The chief manufactures are laces (for which this city has long been famous), furniture, metal, and leather goods. It is the centre of the national railway system, and is connected with different parts of Belgium by two canals. The population of Brussels has increased with remarkable rapidity. From 84,000 in 1825 it rose to 152,828 in 1856, 182,305 in 1890, and 211,429 in 1900. Including its suburbs, the inhabitants number 500,000. The foreign element, especially natives of France, is very prominent.

The hamlet of Bruscelle (swamp dwelling) first sprang up in the Seventh Century, round a chapel erected by Saint Gerald, on an island in the Senne. About 1050 it became a cathedral town and acquired extensive municipal rights, in defense of which it fought bitterly against the Dukes of Burgundy, into whose possession it came in 1430. Mary of Burgundy brought the town to her husband, Maximilian I. Under Charles V. Brussels was made the Court residence in the Netherlands, and became afterwards, under Philip II., the chief scene of the Revolution and of the atrocities committed by the Duke of Alba and the Inquisition. It surrendered to Alexander of Parma in 1585. Brussels suffered greatly in the war of Spain against Louis XIV., in whose reign it was bombarded by Marshal Villeroi, and in that of Austria against Louis XV.; but still more from the continual prevalence of party animosities caused by the policy of Austria. Under the mild rule of Maria Theresa Brussels flourished greatly, and in this time many of its best institutions and public buildings were founded. In 1789 occurred the Brabant Revolution, under Joseph II., and scarcely had Austrian rule been reëstablished, after a brief time of independence, when Brussels fell into the hands of the French, under Dumouriez (1792). After other changes of fortune, Brussels, with the other parts of Belgium, was incorporated with the kingdom of the Netherlands in 1815, and so remained until the Revolution of 1830, when, after a four days'

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murderous struggle between the soldiers and populace in the streets of the town, the independence of Belgium was declared, and Brussels was made the capital of the kingdom.

BRUSSELS, UNIVERSITY OF. A Belgian university which derives its chief interest from the fact that it was founded without coöperation of State or Church, and is in that respect unique in Europe. The Revolution of 1830 destroyed the old University of Louvain, already shattered by the French wars. The Liberal Party, under the lead of Theodore Verhaeghen, in 1834 established in its place the Free University of Brussels, largely by private subscription. This and the number of students at first proving insufficient to maintain the new foundation, as a result of further efforts more money was secured from private sources. The city of Brussels and the Province of Brabant subsidized the institution, and the city further gave it a building. In 1902 the university had over 1000 students, divided among the faculties of philosophy, law, mathematics and science, medicine, pharmacy, and a polytechnic school. It comprises also a school of political and social science.

BRUSSELS CARPET. See CARPET.

BRUSSELS CONFERENCE. An important international conference of the Powers of Europe held in Brussels, Belgium, July 27, 1874. It was called on the suggestion of the Russian Emperor, with a view to ameliorate and render more humane the rules and usages of war. The United States did not send a representative, and Great Britain sent but one, after notifying the Powers that she opposed any consideration of the rules of naval warfare by the Conference. All of the leading nations of Europe were represented. A draft code, or project, was prepared by Russia and submitted to the other governments before the meeting, with the understanding that it should be freely discussed, and that, in case a unanimous conclusion was reached, a new declaration, embodying the opinion of Europe thus manifested, should be published by the Powers.

Upon many topics the representatives were agreed, but upon others the differences of opinion were found to be irreconcilable. There was general unanimity as to the definition of combatants, non-combatants, and spies; as to the legitimate means of injuring an enemy; concerning the conduct of sieges and bombardments, the treatment of prisoners of war, as well as of the sick and wounded, flags of truce, capitulations, and armistices.

The representatives could not agree, however, as to what constitutes hostile occupation of invaded territory. The view taken by England and some other States was that a territory was not to be deemed occupied by an invader, unless he had force enough to repress any insurrection; while Germany and other States held that the rule applying to naval blockades did not apply to occupation of invaded territory. It need not be, at every moment, effective. It was enough that the invading army had broken down organized opposition, and had assumed complete control for a time, even though it had advanced to other sections. Another point of difference related to the right of a people to rise *en masse* and oppose invaders, even though not organized as a part of a regular military force. Here, again, England sided with the small States, and refused to concur in a policy which, in her opinion, would tend to paralyze patriotic resistance by the masses of an invaded nation.

Although the Conference fell far short of accomplishing the purpose for which it was called, it marks an important advance in international law. See HAGUE CONFERENCE; BELLIGERENT; SPY; NON-COMBATANT, etc., and INTERNATIONAL LAW, and the authorities there referred to.

BRUSSELS LACE (so named as it is chiefly made in Brussels). A pillow-lace (see LACE) made with a hexagonal net having four twisted and two plaited sides. Much of the modern Brussels lace is simply a pillow-lace pattern appliquéd in a machine net. (See BOBBINET.) The best Brussels lace is of a very fine linen thread, which has to be spun in damp cellars, for if handled in the dry air it is likely to break; the spinner depends chiefly on her sense of touch for making the thread even. The difficulty and unhealthfulness of the work naturally make the product rare and costly. The rarest qualities have a needlework ground called *point à l'aiguille*. It is said that a choice piece of Brussels lace passes through the hands of seven different workers, each of whom has her special department and does not know what the final pattern will be.

BRUSSELS SPROUT. A cultivated variety of *Brassica oleracea*, distinguished by producing in the axils of the leaves buds or cabbage-like heads an inch or more in diameter. These heads or 'sprouts' are prepared like cabbage or cauliflower for the table. The plant is grown as a fall crop and is cultivated in much the same manner as cabbage. Some varieties attain a height of 4 feet and produce sprouts on nearly the whole length of the stem. The plant takes its name from Brussels, Belgium. See CABBAGE.

BRUT, brōōt. A work by Layamon (c.1200), chronicling in 32,000 verses the wanderings of Brutus the Trojan, and the early legends of British history after his advent. The work is an amplified version of the French *Brut* of Wace, which in turn is taken from Geoffrey of Monmouth. The British Museum contains the two manuscripts of the work.

BRU'TA. See EDENTATA.

BRUTE, Sir JOHN. One of the leading characters in Vanbrugh's comedy *The Provoked Wife*. He is a brutal débauché, who goads his wife to rebellion, and then lacks courage to resent her self-assertion.

BRÜTT, brut, FERDINAND (1849—). A German painter, born in Hamburg. He studied at the Weimar art school. In 1876 went to Düsseldorf, and became a professor in the art academy there in 1893. In 1900 he removed to Cronberg. His genre pictures are marked by cleverness of characterization. A list of his works includes "Disturbed Peasant," "Peasant Delegation," "The Prince on the Promenade," and "The Petitioner."

BRUT'TII. The name of an ancient tribe and a territory of Italy, comprising the southern extremity, or toe, of the peninsula, now called Calabria. The people known as Bruttians became rulers in this part of the peninsula about B.C. 356. Before that the inhabitants seem to have been of some Pelasgian race, but at an early date Greek adventurers started settlements on

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the coast, of which the more important were Crotona, Rhegium, and Locri. The warlike Greeks subjected the natives and held them in slavery until after the Peloponnesian War. At that period the Lucanians came in from the north and still further oppressed the natives. At last, about the middle of the Fourth Century B.C., the people, rising against oppression, became their own masters; they gained power rapidly, captured some of the Greek cities, and, assisted by the Lucanians, held their own against the Grecian arms. The Bruttii were powerful until after their participation in the Samnite War against Rome, B.C. 282. Not long afterwards they were subjected to Rome and gave up much of their territory. In the Second Punic War they revolted and assisted Hannibal, for which they were punished by Rome in the sacrifice of what little they had left of independence. At that time the Bruttii as a nation disappeared from history. In the new reorganization of Italy under Augustus, *Bruttii* and *Lucania* were joined to form the Third Region, and after the time of Diocletian, this region was organized as a province under a *corrector*, or governor.

BRUTUS. A tragedy of Voltaire (1730). which suggested the tragedies *Marcus Brutus* and *Junius Brutus* of Alfieri. (2) A tragedy of Catherine Bernard, produced by the Comédie Française in 1690.

BRUTUS, or THE FALL OF TARQUIN. The title of a play by the American dramatist John Howard Payne (1818).

BRUTUS, or **BRUTE**, THE TROJAN. The mythological first King of Britain, grandson of Ascanius, the son of Æneas. He unintentionally slew his father, Sylvius, and fled to Greece, thence to Britain, where he founded New Troy, or London.

BRUTUS, LUCIUS JUNIUS. A Roman who figures in the legendary history of early Rome, as the hero who overturned the monarchical, and established the republican form of government. The legend runs that he was the son of a rich Roman. On his father's death Tarquin the Proud took possession of the property, and put an elder brother to death, and Brutus himself escaped the same fate only by feigning idiocy (hence the name *Brutus*, stupid). Sent with the two sons of Tarquin to consult the oracle of Delphi about a prodigy, he asked the god who should be the next king. "He who first kisses his mother," was the reply. Returned to Italy, the brothers hastened to Rome to kiss their mother; but Brutus, pretending to slip, fell and kissed his mother earth. Remembering his own wrongs, and gifted with the strength and wisdom of one who was fulfilling the decrees of fate, Brutus, when the foul rape committed by one of the royal family upon Lucretia had shocked the people, convoked them, placed himself at their head, and drove the kings from Rome. He is said to have been then elected one of the two first consuls (B.C. 509). That his character as a stern old Roman hero might be complete, the legend adds that he sacrificed to the new Republic his own sons, detected in a conspiracy to restore the monarchy; and that at last he fell in mortal combat repelling an attack led on by one of the sons of Tarquin. Little more, however, can be said to be established upon sufficient historical evidence with regard to Brutus, than that there existed a person of that name who held high office in Rome at a very early period.

BRUTUS, MARCUS JUNIUS (B.C. 85-42). One of the conspirators against Cæsar. His father bore the same name, was a follower of Marius, and, suffering defeat from Pompey, was at the latter's direction put to death. At this time the son was but eight years old, and his education was in part watched over by his uncle, Marcus Cato, whose philosophy he adopted. He studied and practiced law, like his father before him, but civil life was interrupted by political conditions. On the outbreak of hostilities between Cæsar and Pompey, he gave his support to the man who destroyed his father. Cæsar, however, victor at Pharsalia, pardoned him, took him into favor, and appointed him Governor of Cisalpine Gaul. Here his conduct was that of a high-minded official, and in B.C. 44 the office of *prætor urbanus* was conferred upon him by the same steadfast friend. It was while holding this place that he became a conspirator against the promoter of his career. After the assassination of Cæsar, unable to win a following, he escaped to Athens, and succeeded in raising a large force and becoming powerful in Macedonia. Cassius had been equally successful in equipping an army in Asia, and together they proceeded to Philippi, where they joined battle with Antony and Octavius. As commander of the Republican right, Brutus repulsed Octavius; while Cassius, overcome by Antony, and feeling that their cause was lost, made an end of himself. This example Brutus soon followed. The glamor thrown over the character of Brutus by Shakespeare will, unhappily, not bear scrutiny. He was at one time a relentless usurer, and did not scruple to apply to Cicero as Governor of Cilicia for power to make unlawful exactions. His political affiliations, too, appear suspicious, and his joining the conspirators seems to have been the result of the seductive power of the astute Cassius rather than of any deep-set convictions. Somewhere he was weak or corrupt; but it is charitable to believe that the principles of his Stoic philosophy grew upon him, and that he became worthier of his grand old uncle, Cato. His studies present him in his most amiable light: for, notwithstanding his military successes, he was a student, not a man of action; a theorist, not a doer of deeds. All his writings have been lost.

BRÜX, bruks (Ger. *Brücke*, bridge; its Czech name *Most*, bridge, being a mere translation). A town in the Austrian Crownland of Bohemia, on the Biela, about 50 miles northwest of Prague (Map: Austria-Hungary, C 1). Its principal buildings are the new Rathaus and the Gothic Dechanteikirche, built in 1517. Brüx is the centre of a productive brown-coal district, and manufactures sugar, cast iron, machinery, potash, and enameled ware, and has several breweries and distilleries. In the neighborhood are the bitter-water springs of Püllna and Seidschütz. Population, in 1890, 14,900; in 1900, 21,500. The place was made a city in 1273 by King Ottokar II.

BRUYAS, bru'yä', JACQUES (1637-1712). A French Jesuit missionary. Of the place of his birth, or of his early career, little is known. He went to Canada in 1666, and was sent among the Iroquois Indians as a missionary. He studied

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the Mohawk language, and wrote a work in Latin on the *Mohawk Radicals*, the most extensive work yet written on the subject. He was one of the first to work among those Indians, and may be said to have established the mission there.

BRUYÈRE, bru'yâr', JEAN DE LA. See LA BRUYÈRE.

BRUYN, broin, BARTHEL (1493-1556). A German historical and portrait painter. He was born in Cologne. He successively revealed the influence of Van Eyck, Jan Schoreel, and Holbein; but toward the close of his career he forsook these tendencies, and endeavored to imitate Michelangelo and other masters of Italian art. He was especially celebrated as a painter of portraits, a genre in which he occupied a very high rank. Among his numerous works in the Cologne Museum are the following: "Martyrdom of Saint Ursula," "Adoration of the Magi," "Burgomaster Browiller and Wife." His other productions include: "Corpus Christi" (Cologne Cathedral); "Altarpiece" (Saint Victor's Church, Xanten), a chef-d'œuvre; "Saint Catherine" and eighteen others (Munich Gallery); "Madonna" (Berlin Museum); "Burgomaster Ryth" (ib.); also portraits in the Frankfort, Brussels, Brunswick, and Gotha galleries.

BRUYS, bru'ē', **BRUIS**, or **BRUEYS**, PIERRE DE (?-c.1126). A French religious reformer, founder of the Petrobrusians. Nothing is known of him beyond what is contained in the *Epistola adversus Petrobrusianos Hæreticos*, written by Peter the Venerable (q.v.), Abbot of Cluny, to certain of the bishops of Provence and Dauphiné, not long after the death of de Bruys. He was originally, perhaps, a member of the secular clergy in southern France. His aim seems to have been to restore Christianity to its pristine simplicity. This meant, for him, to reject infant baptism, transubstantiation, prayers for the dead, and, in general, costly churches. But his ill-directed eloquence effected little save violence on the part of his followers. He preached chiefly in the dioceses of Arles, Die, Embrun, Gap, Narbonne, and Toulouse, and was finally apprehended and burned at Saint Gilles. His followers united with the Henricians, which sect, however, did not last long.

BRY'AN. A village and county-seat of Williams County, Ohio, 55 miles west by south of Toledo, on the Lake Shore and Michigan Southern and the Cincinnati Northern railroads (Map: Ohio, A 3). Population, in 1890, 3068; in 1900, 3131.

BRYAN. A city and county-seat of Brazos County, Tex., 100 miles northwest of Houston, on the Houston and Texas Central Railroad (Map: Texas, F 4). It has a considerable trade in live stock, cotton, and cotton-seed oil, and manufactures of cotton-seed oil, flour, carriages, etc. Population, in 1890, 2979; in 1900, 3589.

BRYAN, MICHAEL (1757-1821). An English art critic and connoisseur, born in Newcastle-on-Tyne. He is the author of a biographical and critical *Dictionary of Painters and Engravers* (1813-16), recognized as a standard work. It was revised by R. E. Graves in 1886. In 1794 he was employed by the Duke of Bridgewater and other English noblemen to purchase certain pictures in the Orleans collection of paintings.

BRYAN, WILLIAM JENNINGS (1860—). An American politician, born in Salem, Ill. He graduated at Illinois College in 1881, and at the Union College of Law, in Chicago in 1883, and practiced law in Jacksonville, Ill., until 1887, when he removed to Lincoln, Neb. From 1891 to 1895 he was a member of Congress. He attracted attention as a public speaker soon after beginning the practice of the law, and in Congress he made several effective speeches on free trade. In 1893, and again in 1894, he sought unsuccessfully to secure an election to the United States Senate. He was the editor of the Omaha *World-Herald* from 1894 to 1896, and made many speeches on free silver throughout the Mississippi Valley. An eloquent speech against the gold standard, which he delivered in the Democratic National Convention of 1896, brought him the nomination for President, and soon afterwards he received the Populist nomination also. He canvassed much of the country in person, traveling more than 18,000 miles, and making numerous speeches, but was defeated by McKinley by an electoral vote of 271 to 176. During the next four years, except for a short time in 1898, when he served as a colonel of volunteers in the Spanish-American War, he devoted himself assiduously to preaching the gospel of free silver and opposing trusts and imperialism. In 1900 he was again nominated for the Presidency, this time by the Silver Republicans in addition to the Democrats and the Populists. He again made an active personal canvass, but was again defeated by McKinley, the electoral vote being 292 to 155. Soon after the Presidential campaign of that year he established a weekly periodical, *The Commoner*, which he has since edited. He has published *The First Battle: A Story of the Campaign of 1896* (1896), which also contains some of his speeches and a biographical sketch by his wife.

BRYANT, HENRY GRIER (1859—). An American explorer and traveler. He was born in Allegheny, Pa.; graduated in 1883 at Princeton University, and in 1886 at the law department of the University of Pennsylvania, and in 1892 was second in command in the Peary Relief Expedition to Greenland. In 1894 he commanded the Peary Relief Expedition of that year, and in 1897 the expedition to Mount Saint Elias, Alaska. He was honorary vice-president of the International Geographical Congress in Berlin in 1899, and from 1897 to 1900 president of the Geographical Society of Philadelphia.

BRYANT, WILLIAM CULLEN (1794-1878). A distinguished American poet and journalist. He was born in Cummington, Mass., November 3, 1794, the son of Dr. Peter Bryant, a physician and a member, for several terms, of the Massachusetts Legislature. He showed his precocity as a poet by publishing verse, at the age of thirteen, in the *New Hampshire Gazette*, and by writing the following year a satirical poem, "The Embargo," in the Eighteenth-Century manner: his most famous poem, "Thanatopsis," was probably composed in 1811, though it was not published till 1817. Bryant studied for a year at Williams College, then took up law. He was admitted to the bar in Plymouth, Mass., in 1815, practiced in Plainfield, Mass., for a year, and in Great Barrington for nine years. During this time he was so well known as a poet that he was

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invited to deliver the Phi Beta Kappa poem at Harvard College in 1821, and his poem on that occasion, "The Ages," was published with several others in the same year. In 1825 Bryant removed to New York, where he became editor of the *New York Review*. In the following year he became assistant editor of the *New York Evening Post*, and in 1828 was made editor-in-chief of that paper—a post which he held till his death. During this time he wrote and published many poems and several works in prose, besides his regular newspaper articles. Aside from his poems, which were published occasionally in various newspapers and magazines, such as the now forgotten *United States Literary Gazette*, the *New York Ledger*, the *Atlantic Souvenir*, as well as in the *New York Evening Post*, *Harper's Weekly*, and the *North American Review*, Bryant's chief published works are the following: *Letters of a Traveler* (1850); *Letters from Spain and Other Countries* (1859); *Letters from the East* (1869); *Orations and Addresses* (1873); and several volumes of collected poems. During the period of his active literary work he found time to translate the epics of Homer, his well-known version of the *Iliad* appearing in 1870, and that of the *Odyssey* in 1871-72. His death occurred in New York, June 12, 1878, as the result of a sunstroke, while he was making an address at the unveiling of a statue in Central Park.

The literary and journalistic career of Bryant comprises nearly two-thirds of a century. Noted, as a boy for his precocity, and as a man, living for fifty years in the largest city in America, for the simplicity and wholesomeness of his life and for his distinction of mind and bearing, his career is one of the longest in the history of American letters. He is best known as a poet. His "Thanatopsis," "To a Waterfowl," "The Death of the Flowers," "The Fringed Gentian," "The Crowded Street," "My Country's Call," "The Battlefield," and several other poems are popular, and such lines as "Truth, crushed to earth, shall rise again" (from "The Battlefield"), and "The melancholy days are come, the saddest of the year" (from "The Death of the Flowers"), have become household quotations. The poems named were produced at widely different periods during his life, but they may be taken as representative of the quality of his work, which, during his long life, changed very little. Generally speaking, the poetry of Bryant is distinguished for its restrained and grave thoughtfulness. Its prototypes are to be found, if anywhere, in Gray's *Elegy*, the discursive verse of Cowper, and the nature poetry of Wordsworth. Though in finish of form, restraint, lack of fire, reflectiveness, and sentiment, it belongs to the type of the Eighteenth Century rather than to the period of passionate expression which, in England, was contemporaneous with it, Bryant's poetry, nevertheless, is not wanting in originality. Besides its frequent tenderness and sympathy with sadness, one notes in it a feeling of refined patriotism, a constant love of liberty, and a zeal for the institutions of freedom. Thus, the poet frequently expresses his sympathy with the Greeks in their struggle for liberty, and this emotion grows stronger in face of the battle of the North against slavery, rising, in "My Country's Call," to more impassioned expression than is ordinarily to be found in his verse. So, too, one finds in his poetry admiration for whatever is noble and generous in the life of the North American Indian and other primitive peoples, though his feeling for the red man is probably based on a vaguer and even more remote tradition than that of his contemporary, Cooper. In all the poems, however, the constant note is moralizing, void of subtlety. Most of the poems of Bryant are short, and the verse-forms are not very numerous; the one in which he attained greatest skill is a simple blank verse, as in "Thanatopsis." This verse is employed in his translations of the *Iliad*.

As a journalist, Bryant, though less popularly known to-day than such an editor as Horace Greeley, may be regarded as among the most distinguished of Americans. For a full half-century he was, as proprietor and editor of the *New York Evening Post*, one of the most insistent and uncompromisingly urgent of all the anti-slavery propagandists of the North. The prose style of his editorial articles was simple, straightforward, and vigorous, lacking in subtlety and ambiguity, and never failing to make its point, and is marked, in substance, by common sense and breadth of view. Like all ephemeral writing, Bryant's leading articles are unread; and the same remark, in general, applies to his more elaborate prose productions—his books of travel, his addresses, his few stories, and his literary essays, of which that on Irving is the best. These essays belong to the judicial manner of Dr. Johnson rather than to a more modern and impressionistic school of criticism.

It should be added that Bryant has had no superior as a poetic describer of American scenery, especially in its larger, more spacious phases. It is worth noting, also, that between 1828 and 1845, when the cares of journalism pressed heavily upon him, his poetic productivity suffered. After the latter date almost to his death he showed a rather surprising affluence and power, publishing many of his best poems, such as "The Flood of Years." Finally, readers should be cautioned against believing that "Thanatopsis" is entirely the product of a mere youth, since the famous passage about the quarry-slave was apparently added several years after Bryant reached his majority.

The best edition of Bryant is that of his son-in-law, Parke Godwin, in six volumes, *The Life and Works of William Cullen Bryant* (New York, 1883-84). There is a *Life* by John Bigelow, in the *American Men of Letters* series (Boston, 1890). Good critical appreciations are those of E. C. Stedman, in *Poets of America* (Boston, 1885), and of Prof. Barrett Wendell, in *A Literary History of America* (New York, 1900).

BRYAXIS (Gk. Βρύαξις). A Greek sculptor, contemporary of Scopas, Timotheus, and Leochares, with whom he participated in the work on the Mausoleum at Halicarnassus about B.C. 350. He also created five colossal figures of the gods at Rhodes, statues of Bacchus at Cnidus, of Æsculapius and Hygeia at Megara, of Apollo in the grove of Daphne at Antioch, of Serapis at Alexandria, and a portrait of Seleucus. In 1891 a basis for a tripod, bearing his signature and three small reliefs, was found in Athens, and has suggested the possibility of identifying his work among the reliefs from the Mausoleum. His statue of Serapis seems to have given the type for all the later heads of this deity. Con-

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sult *Bull. Corresp. Hellénique*, XVI. (Paris, 1892).

BRYCE, JAMES (1838—). An eminent English writer and legislator. He was born in Belfast, Ireland, studied at Glasgow University, and in 1862 graduated at Trinity College, and won a fellowship in Oriel College, Oxford. In 1864 he published a monograph, *The Holy Roman Empire*, which, subsequently much enlarged, quickly gave him a reputation as an historical writer of unusual insight and ability. Scholarly, brilliant, and original in treatment, marked throughout by careful thought and painstaking research, a model of condensation and lucidity, this book has been widely read in England, in America, and on the Continent of Europe, has been translated into several European languages, and is still regarded as the standard compendious work on the subject. In 1867 Mr. Bryce became a barrister at Lincoln's Inn, and practiced until 1882. He was appointed regius professor of civil law at Oxford in 1870, but resigned in 1893, after twenty-three years of successful service. In 1880 he entered political life as a member of Parliament for the Tower-Hamlets, and attained immediate prominence as a Liberal and a follower of Gladstone. He became Under-Secretary of State for Foreign Affairs in Gladstone's Government in 1886, Chancellor of the Duchy of Lancaster, with a seat in Gladstone's Cabinet, in 1892, and president of the board of trade in 1894. In 1894 he also served as chairman of the Royal Commission on Secondary Education, and was elected fellow of the Royal Society. As a politician, he has consistently taken the Liberal side in all the great controversies that have arisen since his election to the House of Commons, and has been especially conspicuous as an advocate of home rule for Ireland, of the abolition of university tests, of international copyright, and of the thorough revision of the statute law. Though thus prominent as a teacher and a politician, he is much better known as a writer, and especially as the author of *The American Commonwealth* (last ed. 1895), the material for which he collected during three visits to the United States in 1870, 1881, and 1883. In this work he gives, with remarkable accuracy, sympathy, and insight, probably the best account ever written of the political institutions of the United States, considered in their relation to the history, the character, and the habits of the American people. Besides numerous essays and magazine articles, he has published two excellent books of travel: *Transcaucasia and Ararat* (4th ed. 1896), and *Impressions of South Africa* (1897), and a volume of *Studies in History and Jurisprudence* (1901).

BRYC'TON, HENRY DE. Occasional variant for BRACTON.

BRYDGES, brij'ez, Sir SAMUEL EGERTON (1762-1837). An English bibliographer and genealogist. He was educated at Cambridge, and was admitted to the bar, but never practiced. His best works were an extensive edition of Collins's *Peerage* (1812) and editions of early English writers. He also published *Censura Literaria* (1805-09); *The British Bibliographer* (1810-15); and *The Autobiography, Times, Opinions, and Contemporaries of Sir Egerton Brydges* (1834).

BRYENNIOS, *Gk. pron.* brē-ĕn'nē-ōs, PHILOTHEOS (1833—). A Greek theologian. He was born in Constantinople, was educated in the Patriarchal Seminary at Chalkis, and attended courses at the universities of Berlin, Leipzig, and Munich, where he became familiar with German theology. He consorted with Western theologians more frequently than is customary among Greek ecclesiastics, and attended the Bonn Conference of Old Catholics in 1875. He was professor of church history at Chalkis, Metropolitan of Seres, and afterwards Metropolitan of Nicomedia. He was the discoverer of the first complete manuscript of the two *Epistles of Clement*, published in 1875, and of the only known manuscript of *The Teaching of the Twelve Apostles*. The publication of the latter, in 1883, along with notes and prolegomena, all in Greek, was one of the most notable theological events of the day, and led to the production of an extensive literature. Both manuscripts were found in 1873 in the Monastery of the Holy Sepulchre, Constantinople, in one cover along with four others. See TEACHING OF THE TWELVE APOSTLES.

BRYM'NER, DOUGLAS (1823—). A Canadian journalist and archivist. He was born in Greenock, Scotland; was educated in a grammar school there, and in 1857 removed to Canada, where for a time he devoted himself to farming. He afterwards became a journalist, and for some time was editor of the *Presbyterian* (the official organ of the Presbyterian Chuch in Canada), and associate editor of the Montreal *Daily Herald*. In 1872 he was appointed Archivist of the Dominion of Canada, and in this capacity he has rendered important services to students of American history by issuing a series of volumes containing abstracts of the valuable manuscripts stored in the Canadian archives.

BRYN MAWR (mär) **COLLEGE.** An institution for the higher education of women at Bryn Mawr, Pa., about 10 miles northwest of the centre of Philadelphia. It is beautifully situated, at an elevation of about 400 feet above the sea. The college was founded by Joseph W. Taylor, was incorporated in 1880, and opened for students in 1885. Mr. Taylor was a member of the Society of Friends, and he provided that the trustees of the college should be members of that body.

Bryn Mawr is distinctive among women's colleges in that its course and method of study are based upon the university model. The system of 'major and minor electives in fixed combination' has been adopted; students are grouped in accordance with the work they have actually accomplished, instead of by arbitrary 'classes'; original research is in all cases encouraged; and, in pursuance of the same policy of placing the scholarship of the college upon a basis of pure merit, candidates for admission as undergraduates are not accepted upon certificate, and honorary degrees are not granted. The college offers the graduate degrees of A.B., A.M., and Ph.D. Eleven resident fellowships, eight graduate scholarships, and three European fellowships are offered to graduate students, and there are also scholarships and a students' loan fund for undergraduates.

Bryn Mawr has grown rapidly since its foundation, and in 1902 had 45 professors and instructors, and a student body of 425. The library, largely designed for specialized study, contained

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in the same year over 33,000 bound volumes and 8000 pamphlets, including the classical library of Professor Sauppe of Göttingen. The college buildings include five halls of residence, accommodating about 60 students each—Taylor Hall containing the lecture-rooms, library, and offices of administration, a well-equipped gymnasium, and Dalton Hall, containing the scientific lecture-rooms and laboratories. The endowment fund of Bryn Mawr College is $1,000,000, the value of the buildings and grounds is $960,000, and the annual income is about $106,000. President, Miss M. Carey Thomas, LL.D. Consult the President's *Annual Report* (Philadelphia, 1887, et seq.).

BRY'ONY (Lat. *bryonia*, Gk. *βρυωνία*, *bryōnia*, from *βρύειν*, *bryein*, to teem, swell). A genus of plants of the order Cucurbitaceæ. The common Bryony (*Bryonia dioica*), the only British species, is frequent in hedgerows in England, but is not indigenous to Scotland. It has cordate-palmate leaves, axillary bunches of flowers, and red berries about the size of a pea. It abounds in a fetid and acrid juice. The root is perennial, very large, white and branched, has a repulsive smell, and is acrid, purgative and emetic. *Bryonia alba*, common in the middle parts of Europe, possesses similar properties. The root of both is applied locally to bruises, and was formerly very much in use as a purgative. It contains a bitter glucoside, called *bryonin*, to which it seems to owe its properties. The young shoots of both species are, however, so free from acrid and dangerous qualities, that they may be used as pot-herbs. The roots of the other species of the genus are also acrid and purgative. *Bryonia Abyssinica*, the roots of which are eaten, more properly belongs to the genus Coccinia. Black Bryony (*Tamus communis*) is a plant of a different order, Dioscoreaceæ.

BRY'OPHYL'LUM (Gk. *βρύον*, *bryon*, a mossy seaweed, blossom + *φύλλον*, *phyllon*, leaf). A genus of plants of the natural order Crassulaceæ. *Bryophyllum calycinum*, a succulent shrubby plant, a native of the Moluccas, with quinate or almost pinnate leaves, oblong deeply crenulated leaflets, and panicles of large pendulous greenish-yellow flowers, is not unfrequent in hothouses, being regarded as an object of interest, on account of its producing buds on the edges of the leaves. If a leaf be placed upon moist sand or earth, in a short time new plants will appear from its indentations. This curious mode of propagation is found also in the bog-orchis (*Malaxis paludosa*), a plant of a very different natural order.

BRY'OPHYTES (Gk. *βρύον*, *bryon*, a mossy seaweed, blossom + *φυτόν*, *phyton*, plant). One of the four primary groups of the plant kingdom, containing the two great divisions popularly known as Mosses (*Musci*) and Liverworts (*Hepaticæ*). The liverworts are considered to have been derived in some way from the green Algæ, and to have given rise in turn to the mosses. It is the liverworts, therefore, which represent the transition between the aquatic life of Algæ and the terrestrial life of most Bryophytes. As a consequence of this transition from the aquatic to the terrestrial habit, great changes in structure were produced, so that the Bryophytes are very different from the Algæ.

One of the most important facts connected with Bryophytes is the distinct Alternation of Generations (q.v.) which they exhibit. The group is also distinguished by the free and many-celled sex-organs. The antheridium (male organ) is a body of various shapes, from ovoid to club-shaped, and consists of a single layer of sterile cells, which serves as a wall; within this there is a compact mass of very small and numerous mother-cells, each one of which organizes a single biciliated sperm. The sperm of Bryophytes is one of their distinguishing characters, the body being small, little if at all curved, and always bearing two cilia. The archegonia are flask-shaped organs, consisting of neck and venter, the latter containing the single large egg. See ANTHERIDIUM and ARCHEGONIUM.

The fertilized egg lies within the venter of the archegonium, and when it begins to germinate the venter also begins to increase in size and in character. In the true mosses the young sporogonium grows faster than the venter, and finally breaks it, carrying the whole top of the modified archegonium upon its apex like a cap. This loose cap may be found upon the capsules even when they are ready to shed spores, and is known as the calyptra. The gradual evolution of the sporophyte, from its simplest form in the liverworts to its most complex form in the true mosses, is of great morphological interest. The simplest sporophyte in Bryophytes is that of the liverwort known as Riccia, in which it consists of nothing more than a capsule with a single layer of sterile cells for a wall, all of the cells within being devoted to the production of spores. As one passes from Riccia to the higher forms, there is a gradual diminution of the tissue devoted to the production of spores, and therefore a gradual increase of the sterile tissue. Finally, in the true mosses the sterile tissue far exceeds in mass the sporogenous, the former consisting of foot, seta, and the bulk of the capsule; while the latter is restricted to a single layer or two of cells within the capsule.

The opening (dehiscence) of the capsule is also a matter of interest among the Bryophytes. In the lower liverworts the wall merely decays or bursts, liberating the spores. Among the leafy liverworts it splits into four distinct valves, which spread apart. Among the liverworts of the genus Anthoceros the capsule is elongated like a very slender pod and splits into two valves like a pea-pod. Among the mosses, however, a distinct lid ('operculum') is developed, which is pushed aside when the capsule is ready to discharge its spores. In the true mosses a further elaboration of the capsule usually occurs in the formation of what is called the 'peristome,' a set of tooth-like processes often of beautiful pattern, which spring from the rim of the capsule and stretch toward the centre. These are hygroscopic, and by their curving in and straightening out help to loosen up the spores. Among the liverworts there is also a device for assisting in spreading and somewhat scattering the spores. Certain mother-cells do not produce spores, but become modified into long fibre-like cells, which are spirally thickened. These cells are known as 'elaters,' and by their jerking, jumping movements when alternately moistened and dried they help to scatter the spores with which they are in contact.

The sex-organs of Bryophytes are borne in a variety of ways. Among the liverworts they are sometimes scattered over the back of the thallus body; in others they are collected in definite

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groups upon the body; in still others, as in Marchantia, they are carried upon a special branch, at whose summit there is a disk in which they are developed. In the mosses the antheridia and the archegonia occur in clusters at the ends of main axes or branches. In some cases the antheridial and archegonial clusters are separated; in others, the two organs are found in the same cluster. The leaves at the tips which bear the sex-organs become more or less modified, forming a rosette, and, usually being larger than the ordinary leaves and sometimes differently colored, they have been called 'flowers.' Among the sex-organs, and especially among the antheridia, there often occur hair-like outgrowths, known as 'paraphyses' (q.v.). For a further account of the two great groups of Bryophytes, see HEPATICÆ and MUSCI.

In addition to the books cited under MORPHOLOGY, all of which treat more or less fully of this group, consult Campbell, *Mosses and Ferns* (New York, 1895), which gives a more detailed account of the structure and development of Bryophytes. For works on classification, see authorities referred to under TAXONOMY.

BRY'OZO'A (Gk. βρύον, *bryon*, a mossy seaweed + ζῷον, *zōon*, animal). A class of marine animals allied to the brachiopods and worms, and called Bryozoa by Ehrenberg, in 1832, on account of the moss-like habit of many members of the group. In the early days these animals were usually confounded with the Hydroids, to some of which they are quite similar, and already in 1830 they had received at the hands of J. V. Thompson, a British zoölogist, the name 'Polyzoa,' in reference to the colonial habit of the organism. This latter name has been used to great extent by the British zoölogists, often to the entire exclusion of the term Bryozoa, while American and French authors have preferred the name given to the group by Ehrenberg. In accordance with the classification adopted by Parker and Haswell, which is followed in its main features in this Encyclopædia, the animals of this group are described under the name POLYZOA.

BRY'SON, See ANTIPHON AND BRYSON.

BRYLOFF, brȳ'lŏf, KARL PAVLOVITCH (1799-1852). A celebrated Russian painter, born in Saint Petersburg. He was one of a family of artists descended from a French refugee, and early showed such promise that he was sent to Italy with his brother to study. One of his best-known works, executed while there, is "Pompeii" (1833). After leaving Italy, he visited Greece, Turkey, and the Holy Land, and on his return to Russia settled in Moscow. Afterwards he resided in Saint Petersburg, where he was professor at the Academy, and the master of many pupils. Among his works are some notable portraits, genre scenes, historical paintings, particularly "The Murder of Inez de Castro" (in the Hermitage at Saint Petersburg); some frescoes in the Cathedral of Saint Isaac, and many religious pictures.

BRZEZANY, b'zhâ-zhä'nĭ (from OCh. Slav. *brĕza*, Pol. *brzoza*, AS. *birce*, Engl. *birch*). A town in the Austrian Crownland of Galicia, on the Zlota-Lipa, near the Dniester, 50 miles southeast of Lemberg (Map: Austria, J 2). It manufactures leather, distills alcohol, and has a trade in wheat and agricultural products. Population, in 1890, 11,221; in 1900, 11,244, half of whom are Jews.

BUACHE, bû-äsh' (after the French geographer Buache), or GARDEN ISLAND. An island of Western Australia, measuring 6 miles by 1, and situated near the mouth of Swan River, in latitude 30° 10′ S., and longitude 115° 40′ E. It is important as sheltering from the open ocean the deep and spacious anchorage of Cockburn Sound, which flows between it and the mainland.

BUACHE, bȳ'ash', PHILIPPE (1700-73). A French scholar and geographer, born in Paris. In 1729 he was appointed royal geographer, and in 1730 a member of the Academy of Sciences. He was distinguished for his system of physical geography, according to which he divided the earth's surface into river-valleys and watersheds, and arranged the ocean by means of submarine mountain chains, whose presence he held to be indicated by shoals and islands. His most important works are *Considérations géographiques et physiques sur les nouvelles découvertes au nord de la grande mer* (1753); and an *Atlas physique* (1754).

BUANSU, bōō'an-sōō'. The Anglicized native name, in the Himalayan region, of the Indian wild dog (*Cyon Deccanensis*), known by other names elsewhere in India. See DHOLE and DOG.

BU'BALIS, or **BU'BALE** (Neo-Lat., Gk. βούβαλις, *boubalis*, an African species of antelope). An antelope (*Alcelaphus bubalinus*), one of the north African hartbeests, supposed to be the *bubalus* of the ancients. It is about the size of a large stag, with a long, ox-like head and muzzle, and heavily ringed lyrate horns. The color is bay, with a black tuft on the end of the tail. It is now nearly extinct in the eastern Sahara. See HARTBEEST and Plate of ANTELOPES.

BUBAS'TIS, or **BUBAS'TUS** (Gk. Βούβαστις, *Boubastis*, Βούβαστος, *Boubastos*). The Greek name of the Egyptian city Pe(r)-Ubastet (House of Ubastet), mentioned in the Bible (Ezek. xxx. 17) as *Pi-beseth*. It was a place of considerable importance, devoted, as its name implies, to the worship of the goddess Ubastet (q.v.), and was the home or birthplace of the Pharaohs of the twenty-second and twenty-third dynasties. The site of Bubastis is marked by the ruins of Tell-Basta, near Zagazig, on the line of railway between Cairo and Suez. These ruins offer little to attract the attention of tourists, but excavations conducted on the spot by Naville, in 1887-88, brought to light many remains of fine temples and sculptures. The results of these excavations have been published by the Egypt Exploration Society in Memoir VIII., *Bubastis* (1891), and in Memoir X., *The Festival Hall of Osorkon II.* (1892). In the neighborhood is an extensive cemetery, in which cats —the animal sacred to the local goddess—were buried in such numbers that their bones have recently been employed in the manufacture of fertilizer.

BUBASTIS (Egyptian *Ubastet*). A goddess of the Egyptians, worshiped at the city of the same name. Her sacred animal was the cat, and she is represented on the monuments either as a cat or as a woman with a cat's head. The Greeks identified her with Artemis, though the ground of this identification is not clear. Bu-

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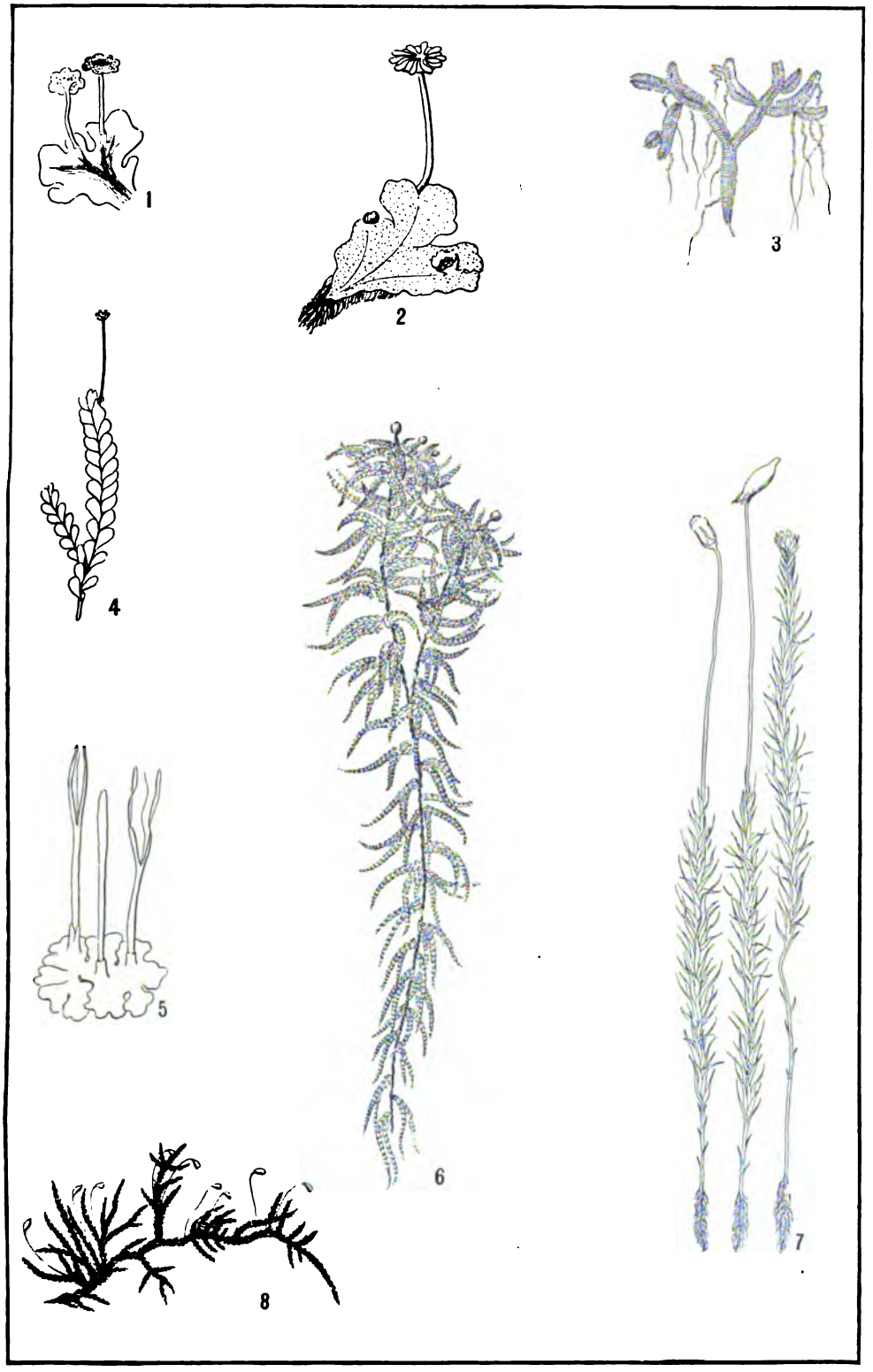
BRYOPHYTES



LIVERWORTS:
1. MARCHANTIA (Male).
2. MARCHANTIA (Female).
3. BAZZANIA.
4. NOTEROCLADA.
5. ANTHOCEROS.

MOSSES:
6. SPHAGNUM.
7. POLYTRICHUM.
8. HYPNUM.

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bastis was rather a solar than a lunar divinity, and, unlike Artemis, she was a goddess of joy and mirth. Her great annual festival at Bubastis was usually attended with excessive revelry.

BUBBLE. An English term, defined by Blackstone as an unwarrantable undertaking by unlawful subscriptions, subjecting the parties who originate and put them in operation to the penalties of *præmunire* (q.v.). The South-Sea Scheme and the Mississippi Scheme (q.v.) are examples. The Bubble Act was "enacted the year after the infamous South-Sea project had beggared half the nation," to punish the fraud. It was repealed, however (6 Geo. IV. c. 91), and such companies are now dealt with by the common law. Consult *The Bubbles of Finance* (London, 1865).

BUBBLE. The 'city gallant' in Cooke's play which was originally known by the latter title, but which came finally to be called *Greene's Tu Quoque.* The part of Bubble was originally played by the famous comedian Greene. The rôle is that of a servant who becomes rich and affects the niceties of speech. A pet phrase of his is 'tu quoque,' which is constantly on his lips. Greene's lisping of the words became so famous that the play came first popularly, and then authoritatively, to possess its present title.

BUBBLE-SHELL. A mollusk of the large and widely distributed marine gastropod family Bullidæ, whose shells are egg-shaped (often as large as a hen's egg), and so thin as to suggest a likeness to bubbles. They are protected by wide, upturned flaps of the mantle, also used, it is said, in swimming. They frequent muddy and sandy bottoms, hiding under seaweed or burying themselves in the mud. All are animal feeders, and have large mouths, and the gizzard very muscular; and among its thick coats, in many species, are found calcareous bony plates, which, being moved against each other by its muscles, serve to grind down the food. A species of the eastern American coast is *Bulla solitaria,* having a brown-spotted shell.

BUBI, bōō'bê. A Bantu tribe of Fernando Po, in the Gulf of Guinea. The tribal name means 'men,' and they call their island the universe. They number about 30,000, and are commonly held to be feeble and treacherous.

BU'BO (Med. Lat., from Gk. *βουβών, boubōn,* groin). A tumor consisting of a swollen lymphatic gland in the groin, armpit, or neck, the inflamed condition being secondary to an infection elsewhere, such as gonorrhœa (q.v.), chancroid, or syphilis (q.v.). Bubo is a prominent symptom of bubonic plague. See PLAGUE.

BUBON'IC PLAGUE. See PLAGUE.

BUCARAMANGA, bōō'kä-rä-mäŋ'gä. The capital of the Department of Santander, Colombia, situated on the Lebrija River, over 3000 feet above sea-level (Map: Colombia, C 2). It is the seat of a United States consular agent, and is the chief market for the western part of Santander, a district producing tobacco, cotton, cocoa, etc. There are also valuable deposits of gold, copper, and iron. Population, about 20,000.

BUC'CANEER' (Fr. *boucanier,* from *boucan,* smoke-house, or place for curing meat; see below). A title applied to the adventurers who were known to the French as *Filibustiers,* to the Spanish as 'demons of the sea,' and among themselves as 'brethren of the coast.' These pirates infested the Caribbean Sea and harried the Spanish Main and the coasts of North America in the Sixteenth and Seventeenth centuries. The ruthless religious wars of the Sixteenth Century in Europe produced a body of daring fighters and seamen, like Drake, Hawkins, and Davis, who obtained large wealth in privateering operations against Spain, which were little better than legalized piracy according to the standards of a more humane age, although justified by the ideas and methods of their own time. Naturally enough, when in 1680-85 the English Government undertook the suppression of freebooting and the semi-legal way was closed, open piracy was resorted to by the wild and reckless spirits whom the region and the age produced in such numbers. 'Buccaneers' is the name especially applied to the pirates of the Seventeenth Century; those of the Eighteenth were known as 'marooners.' The buccaneers at first had their headquarters on the little island of Tortuga del Mar, off the northwest coast of San Domingo, in the Bahama Channel, which was the main line of Caribbean commerce. They raided San Domingo, and, taking the cattle from the Spanish plantations, dried the meat in buildings known in French as *boucan,* and sold it to passing vessels which put in for provisions. Later they made these very ships a prey, and took to the sea themselves. From the Elizabethan seamen, who made war according to the ways of their age upon Spain, through the earlier buccaneers like Sir Henry Morgan, who confined his attacks to Spanish towns and vessels, and was given a kind of left-handed recognition by Spain's enemies, and Captain Kyd, who represents the transition to the out-and-out pirate, the line of development continues straight to the notorious marooners like Blackbeard, Roberts, and Avery. The name 'marooners' came from the practice of the later pirates of marooning, or putting their victims whom they did not otherwise dispose of ashore on desert islands or other inhospitable coasts.

The story of the buccaneers, as it has been told, is much encumbered with fable. Its principal sources are the narrative of the Dutchman Esquemeling, who served with Morgan, and seems to have told a fairly correct story. This narrative was translated from the Dutch into French and English. Capt. Charles Johnson edited, in the early part of the Eighteenth Century, numerous chap-book histories of pirates and highwaymen. His first edition was entitled *General History of the Pyrates of New Providence* (1724-27), and the second, *The History of Highwaymen and Pirates* (1734-42). Consult, also, *History of the Buccaneers of America* (London, 1816; reprinted 1891); Archenholz, *The History of the Pirates, Freebooters, or Buccaneers of America,* translated from the German (London, 1807); Pyle, editor, *The Buccaneers and Marooners of America* (London, 1891), which contains the narrative of Esquemeling; and Stockton, *Buccaneers and Pirates of Our Coasts* (New York, 1898).

BUCCANEER, THE. A poem, by Richard Henry Dana, the scene of which is laid partly at Block Island. It was published in 1827, in Boston, and was reviewed by William Cullen Bryant in the *North American Review* (Vol. XXVI.,

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page 239). It was republished in a collected edition of his prose and verse, in 1833.

BUCCARI, bōōk'kä-rē, or **BAKAR**, bä'kär. A free port of Croatia-Slavonia, Austria-Hungary, on the Gulf of Quarnerno, 5 miles east-southeast of Fiume (Map: Austria-Hungary, D 4). It is situated on the slope of a hill crowned by a fine castle, and has a small but safe harbor. It has linen manufactures, shipbuilding and fishing industries, the tunny-fisheries being especially important. The grapevine is extensively cultivated in the neighborhood, and good wine is manufactured. Population, chiefly fishermen and sailors, in 1890, 1950.

BUCCELLATI, bōō'chĕl-lä'tē, ABATE ANTONIO (1831-90). An Italian jurist and writer, born in Milan. He was appointed professor of law at the University of Pavia, where he lectured chiefly on canonical and criminal law. He wrote some monographs on Dante, but is better known for his works on law and penology, as: *Sommi principii del diritto penale* (1865); *Pena militare* (1871); *Le système cellulaire* (1876); and *Il nihilismo e la ragione del diritto penale* (1882).

BUC'CINA'TOR (Lat. *būcinator*, trumpeter, from *būcina*, trumpet). A muscle situated in the substance of the cheeks. It is so called because, when the cheeks are distended with air, as in blowing, the contraction of the buccinator muscles forces it out.

BUCCIN'IDÆ (Neo-Lat., from Lat. *bucinum*, a shell-fish used in dyeing purple, from *bucina*, trumpet). A family of gastropod mollusks, with medium or small-sized, heavy, ribbed, spiral shells, having a notch through which the long siphon is extended, instead of a long siphonal canal, as in the Muricidæ and other related forms. It has many genera and species, widely distributed, and includes some of the most familiar shells of the North Atlantic, as the whelks (Buccinum), conchs or winkles (Fulgur and Sycotypus), ivory-shells (Eburna), periwinkles, drills (Nassa, etc), purple-shells (Purpura), etc., besides many stranger tropical forms. See WHELK, CONCH, etc.

BUCCLEUCH, bŭk-klŭ'. One of the oldest and most distinguished ducal families in Scotland. It traces its descent from Sir RICHARD LE SCOTT (1249-85). The ancestor who first became historically conspicuous was Sir WALTER SCOTT of Branxholm and Buccleuch (? 1490-1552), a brave and powerful border chieftain who flourished in the reign of James V. On some incidents in his life his great namesake founded the *Lay of the Last Minstrel*. Buccleuch, from this early period associated with the family title, is a lonely estate in the vale of Rankleburn, Selkirkshire. Sir Walter fought bravely in the battle of Pinkie, 1547, and was slain in an encounter with Sir Walter Kerr, of Cessford, in the streets of Edinburgh, 1552. He was succeeded by his grandson, Sir WALTER SCOTT of Buccleuch (died 1574), a 'knight wise, true, and modest,' who was succeeded by his only son (1565-1611), who bore the same name. This Sir Walter is celebrated for his military exploits on the border, not the least daring being the rescue of one of his attendants, Kinmont Willie, from the castle of Carlisle. For his service to the State, including organizing the border marauders for service in foreign wars, he was raised to the peerage, 1606, as Lord Scott of Buccleuch. Subsequent titles borne by the family are Barons of Eskdale, Earls of Buccleuch, 1619; Earls of Dalkeith, 1642; Earls of Doncaster and Barons Tynedale, England, 1662; Lords Scott of Whitchester, Dukes of Buccleuch, 1663; Viscounts of Nith, Torthorwold, and Ross, Barons Douglass, Dukes of Queensberry, Marquesses of Dumfriesshire, Earls of Drumlanrig and Sanquhar, 1684. The ducal title was conferred on the natural son of Charles II., JAMES SCOTT, Duke of Monmouth (q.v.) of rebellion fame (1649-85). Previously known as Fitzroy and Crofts, he was raised to the dukedom and assumed the family name of his wife, Countess Anne, daughter and heiress of the second Earl of Buccleuch, when he married her in 1663. In 1685 the Duke was beheaded. He left four sons and two daughters, and his duchess retained her honors, titles, and estates in her own right. She afterwards married Lord Cornwallis, by whom she had a son and two daughters; she died in 1732. JAMES, her eldest surviving son, predeceased his mother, and his son FRANCIS, by the death of his grandmother, succeeded to the title of Duke of Buccleuch. HENRY, third Duke of Buccleuch (born 1746), was the greatest and most estimable of his family. He had for tutor and friend Dr. Adam Smith, and his talents were directed toward the improvement of the soil, the planting of trees, the making of roads, the improving of the breed of sheep, and the social elevation of the numerous tenantry on his extensive estates in the south of Scotland. He died in 1812, and was succeeded by his eldest son, CHARLES, fourth Duke, who, dying in 1814, was succeeded by his son, WALTER FRANCIS, born 1806. He is noted for the creation of the deep-water harbor and port of Granton, two miles from Edinburgh, the greatest public improvements ever executed in Scotland by an individual at his own private cost. He was Lord Lieutenant of Midlothian and Roxburghshire, and captain of the Queen's bodyguard in Scotland. He died in 1884, and was succeeded in the title by his son, WILLIAM HENRY WALTER (born 1831). Consult Scott, *Manuscript of William Henry Walter Douglas Scott, Sixth Duke of Buccleuch and Queensberry* (London, 1897).

BUCEN'TAUR (Gk. βοῦς, *bous*, ox + κένταυρος, *kentauros*, centaur). The name of the vessel from which the doges of Venice, on Ascension Day, celebrated the marriage of the city with the Adriatic. This fête was instituted at the close of the Tenth Century to commemorate the subjugation of Dalmatia. At the close of the Twelfth Century the ceremonies for the wedding of the Adriatic received a definite form. A splendid water procession was formed, with the Doge in the *Bucentaur* and the nobles of Venice in gondolas and feluccas. When the vessels arrived at the mouth of one of the channels opening into the Adriatic, the Doge dropped a ring into the water, using the words, "We wed thee with this ring in token of our true and perpetual supremacy." The name *Bucentaur* for the vessel first appears in 1289. The last ship was built in 1722-29, and was destroyed by the French in 1797.

BUCEPH'ALUS (Gk. Βουκέφαλος, *Boukephalos*, literally, ox-headed, from βοῦς, *bous*, ox + κεφαλή, *kephalē*, head). The name of the favorite charger of Alexander the Great. It was probably also the name of a peculiar breed of horses

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in Thessaly. According to tradition, Alexander in his boyhood was the first to break in the steed Bucephalus, and thus fulfilled the condition stated by an oracle as necessary for gaining the crown of Macedon. The town Bucephalia, on the river Hydaspes, in India, was founded near the grave of Bucephalus, which died during Alexander's Indian expedition.

BU'CER, or **BU'TZER,** MARTIN (1491-1551). A Church reformer of the Sixteenth Century. He was born November 11, 1491, at Schlettstadt in Alsace. His real name was Kuhhorn (Ger., cow-horn), but, in accordance with the fashion of his time among scholars, he changed it into its Greek equivalent, Bucer being derived from *βοῦς*, *bous*, ox, cow + *κέρας*, *keras*, horn, and this combination was Latinized *Bucerus*. In 1506 he entered the Order of Dominicans. At the suggestion of his superior, he went, in 1517, to Heidelberg to study theology, devoting his attention, however, at the same time to the Greek and Hebrew languages. An acquaintance with the works of Erasmus had already inclined Bucer toward Protestantism, and his views were confirmed by the influence of Luther at the Heidelberg disputations in 1518, at which Bucer was present. In November, 1520, Bucer left his cell and was for a couple of years chaplain to the Elector of the Palatinate. In 1521 he was released altogether from his monastic vows, and in 1522 he retired in disgust from the Court. Following the example given by Luther at the Diet of Worms (1521), Bucer became one of the boldest and most decided of the German reformers. In 1523 he went to Strassburg, where he introduced the doctrines of the Reformation. It was his great desire to avoid theological divisions, and so he advocated compromises and the use of dubious formulas. Thus in the disputes between Luther and Zwingli he adopted a middle course, and endeavored to make reconciliation between them; but his view of the sacraments, which approached that of Zwingli, exposed him to Luther's harsh reprobation, while at the Diet of Augsburg (1530), where he conducted himself with great circumspection and moderation, he generally accorded with the Lutheran views; but, along with other theologians, declined to subscribe to the proposed confession of faith, and afterwards drew up the *Confessio Tetrapolitana*—i.e. the confession of the four cities: Strassburg, Constance, Memmingen, and Lindau. An agreement, however, was subsequently entered into between Bucer and the Lutherans, and as a disciple of Luther he appeared at the religious conference of the Reformers held in Leipzig. He also tried to unite Protestants and Roman Catholics, as in the Diet of Ratisbon, 1541. He defended the bigamy of Philip of Hesse. In consequence of his refusal to sign the *Interim*—a temporary creed drawn up by order of the Emperor Charles V.—Bucer was compelled to leave Strassburg, and therefore accepted the invitation of Archbishop Cranmer (1549), and went to England to teach theology at Cambridge, and assist Paul Fagius and others in forwarding the Reformation. His modesty, blameless life, and great learning won him many friends in England; but his labors were soon interrupted by death, February 28, 1551. His remains were interred in Saint Mary's Church at Cambridge with great solemnity; but during the reign of Mary his bones, with those of Fagius, were taken from their graves and burned in the market-place. His constant attempts to express himself in language agreeable both to Luther and Zwingli induced in him at times an obscure, ambiguous, and elusive kind of thought, to which, perhaps, Bossuet refers when he stigmatizes Bucer as 'the great architect of subtleties.' The religious passions of the time prevented his contemporaries from forming a fair estimate of his character. By some Protestant writers he is ranked as a theologian above even Luther and Melanchthon. His best work is a translation and exposition of the Psalms, which he published under the pseudonym Aretinus Felinus (Strassburg, 1529). Conrad Hubert intended to edit the whole of Bucer's writings in ten volumes, but only one volume appeared (Basel, 1577), *Tomus Anglicanus*, or those writings which he produced in England. No collected edition has since appeared. A. Lang published *Der Evangelien-kommentar Martin Butzers und die Grundzüge seiner Theologie* (Leipzig, 1900). For bibliography, consult: F. Mentz and A. Erichson, *Zur 400-jährigen Geburtsfeier Martin Butzers* (Strassburg, 1891); for biography, J. W. Baum, *Capito und Butzer* (Elberfeld, 1860); for Bucer's relations with Servetus, see H. Tollin, *Servet und Butzer* (Berlin, 1880).

BUCH, bōōg, CHRISTIAN LEOPOLD VON (1774-1853). A celebrated German geologist, regarded by Humboldt as the greatest geologist of his age. He was born at Stolpe, and received instruction under Werner at the Mining Academy of Freiberg. He afterwards traveled for purposes of geological study through Germany, Scandinavia, Great Britain, France, Italy, and the Canary Islands. As a result of his investigations, the importance of chemical and volcanic processes in nature gained wide recognition among geologists. His chief writings are *Geognostische Beobachtungen auf Reisen durch Deutschland und Italien* (1802-09), and *Reise durch Norwegen und Lappland* (1810); *Physikalische Beschreibung der Canarischen Inseln* (1825); *Beiträge zur Bestimmung der Gebirgsformationen in Russland* (1840); besides several monographs on paleontological subjects. He was also the author of an excellent geological chart of Germany and the neighboring States, published in 42 plates (2d ed. 1832). Consult an English translation of Flourens, "Memoir of Leopold von Buch," in the *Smithsonian Report* (Washington, 1862).

BUCHAN, bŭk'an, ALEXANDER (1829—). A Scotch meteorologist, born at Kinnesswood, Kinross-shire. He was educated at Edinburgh University, was a teacher from 1848 to 1860, and in the latter year was appointed secretary to the Scottish Meteorological Society. In 1871 he became a member of the meteorological council of the Royal Society, and in 1878 of the council of the Royal Society of Edinburgh, of whose library and museum he was at the same time made curator. He has published contributions on "Atmospheric Circulation" and "Oceanic Circulation" to the reports of the *Challenger* expedition; *A Handy Book of Meteorology* (1867); and an *Introductory Text-Book of Meteorology* (1871). He also wrote the article "Meteorology" for the *Encyclopædia Britannica*, 9th ed.

BUCHAN, DAVID (1780-c.1837). An English naval officer and explorer. He attained the

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grade of lieutenant in 1810, that of commander in 1816. In 1818 he was appointed to the command of the expedition dispatched that year by the Admiralty for the discovery of the North Pole. With the ships *Trent* and *Dorothea* he reached latitude 80° 34′ N., but after futile attempts to gain a more northerly point was obliged by stress of weather and floating ice to make for Deptford. During a second expedition his ship was lost at sea. He made some interesting contributions to science with regard to the compression of the earth at its poles, deep-sea and surface temperatures, and other subjects.

BUCHAN, or SIMPSON, ELSPETH (1738-91). A Scottish religious enthusiast. She was born near Banff, and was the daughter of John Simpson, an inn-keeper and member of the sect known as 'Burgher Seceders.' Shortly after her separation from her husband, she went to Glasgow, where she was so impressed by a lecture delivered in 1793 by Hugh White, of the Relief Church at Irvine, that she removed thither, and persuaded Mr. White to believe that she was the woman mentioned in Rev. xii., through whom the divine light was restored to men, and further converted him to the belief that he was the man child she had conceived. Thus arose the sect known as Buchanites, which, banished from Irvine in 1784 by a popular uprising, removed with about forty-six converts to New Cample. The doctrine of the Buchanites was based upon the early expectation of the end of the world. They did not marry, renounced all sensual pleasures, and lived like one family, enjoying community of goods. The sect became extinct in 1848. See BUCHANITES.

BUCHAN, WILLIAM (1729-1805). A Scottish physician, born at Ancram. He published a work on *Domestic Medicine* (1769), which reached its nineteenth edition during his lifetime, and has been translated into many European languages. Buchan died in London, and was buried in Westminster Abbey.

BUCHANAN, bŭk-ăn′*an*, FRANKLIN (1800-74). An American naval officer, prominent in the Confederate service during the Civil War, born in Baltimore, Md. He entered the United States Navy at the age of fifteen; became a lieutenant in 1825, and in 1841 was promoted to the rank of master-commandant. In 1845 he organized the United States Naval Academy at Annapolis under the direction of the Secretary of the Navy, and for two years acted as its first superintendent. He then served in the Mexican War, commanding the *Germantown* during the siege of Vera Cruz, and in 1852-53 commanded Commodore Perry's flagship, the *Susquehanna*, in that officer's famous expedition to Japan. He was promoted to be captain in 1855, and was placed in command of the Washington Navy Yard in 1859, but in 1861 (April 22) he resigned on the assumption that his State would soon secede from the Union. Maryland remained loyal, however, and he asked to be restored, but his request was refused by Secretary of the Navy Welles, and in September, 1861, he received a captain's commission in the Confederate Navy. He commanded the *Merrimac* in the attack upon the Federal fleet in Hampton Roads, and was severely wounded. Soon afterwards he was promoted to the rank of admiral, and for some time was senior officer in the Confederate Navy. In 1863 he became commander of the naval defenses of Mobile, Ala., and in this capacity constructed the iron-clad ram *Tennessee*. In August, 1864, he commanded the Confederate fleet in Mobile Bay, so thoroughly defeated by Farragut (see MOBILE BAY and FARRAGUT, DAVID GLASGOW), and on this occasion lost a leg and was taken prisoner, though he was soon afterwards exchanged. After the war he was for some time president of the Maryland Agricultural College.

BUCHANAN, GEORGE (1506-82). A Scottish historian and poet, noted as tutor of James I. He was born of poor parents in Killearn, Stirling, February, 1506. He was sent to the University of Paris by his uncle, who died two years afterwards, leaving Buchanan without the means of prosecuting his studies. He returned home and, at the expense of his health, fought against the English, being present at the siege of Werk, October, 1523. He entered Saint Andrews University as a pauper student in 1524, in the following year taking his degree of B.A. In 1526 he went to Paris, was admitted B.A. at the Scots College on October 10, 1527, and attained his M.A. degree in March, 1528. He subsequently obtained a professorship in the College of Saint Barbe, but returned to Scotland about 1537. During his residence on the Continent Buchanan adopted the Reformed faith. A satire entitled *Somnium*, exposing the Franciscans, excited the wrath of the priests, and he resolved upon seeking safety in his old college in Paris, when King James V. took him under his protection and intrusted him with the education of one of his illegitimate sons. At the request of the King, Buchanan wrote another satire against the monks, entitled *Franciscanus* (1564), increasing their anger, and arousing the hatred of Cardinal Beaton, who procured Buchanan's arrest and even offered the King money for his death. Though the publication of the satire was due to James, he did not protect the poet, who escaped to Paris. After spending some years in Bordeaux and Paris in tuition, he accompanied the learned Portuguese Govea to the University of Coimbra, in Portugal. After the death of Govea Buchanan was arrested as a heretic, and was for some time detained in a monastery, where he began his splendid Latin metrical version of the Psalms. Restored to liberty in 1551, he went to England, but soon afterwards again sought Paris. About 1560 he returned to Scotland, and made confession of Protestantism. His reputation as a scholar gained him a good reception at the Court of Mary, whose classical tutor he became. But his religious and political principles attached him to the party of the Regent Moray, by whose influence he was appointed principal of Saint Leonard's College, in Saint Andrews University, in 1566, the complimentary inscription on the register reading, "Hujus sæculi poetarum facile princeps." In the following yea. he was chosen Moderator of the General Assembly —a rare honor for a layman. The doings of Mary, which scandalized the Scottish public, disgusted her tutor, and he accompanied Moray to England, to give evidence before the commissioners appointed by Elizabeth to inquire into her guilt. His *Detectio Mariæ Reginæ*, laid before these functionaries, was industriously circulated by the English Court. It, however, contains gross exaggerations, which have been condemned

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by partisan as well as non-partisan historians. In 1570 Buchanan was appointed tutor to James VI. (afterwards James I.), who owed to him the erudition of which in later life he was so pedantically vain. No considerations of the future position of his pupil were allowed to interfere with Buchanan's treatment of him, which was strict, if not even stern. In dedicating his *De Iure Regni apud Scotos* to the young monarch in 1579, he warned him against favorites with remarkable freedom, and his dictum that 'Kings existed by the will of the people' was of special import in the succeeding century. In 1570 Buchanan was appointed Director of Chancery and Keeper of the Privy Seal. He resigned office in 1578 and devoted the rest of his life to the composition of his *History of Scotland* (published in 1582). He died 30 days after its publication, on September 28, 1582, and received public burial in Greyfriars Churchyard, Edinburgh. As a scholar, Buchanan was unrivaled in his age, and he wrote Latin poetry 'with the purity and elegance of an ancient Roman.'

He was alike humorous, sarcastic, and profound. His *History*, written in Latin, is remarkable for the richness, force, and perspicuity of its style, though its narration of contemporary events shows partiality. Two years after the author's death, it, as well as *De Iure Regni*, etc., was condemned by the Scottish Parliament, and every person possessed of the copies was ordered to surrender them within 40 days, in order that they might be purged of 'the offensive and extraordinary matters' they contained. The latter work was again condemned in 1664, and in 1683 was burned by the loyalist scholars of Oxford. Two collected editions of Buchanan's works have been published—one by Ruddiman (2 vols., Edinburgh, 1715) and another by Burmann (2 vols., Leyden, 1725). Translations that have appeared do little justice to the original. Consult Dr. Irving, *Memoirs of the Life and Writings of George Buchanan* (2d ed. Edinburgh, 1817).

BUCHANAN, George (1827—). A Scotch surgeon and author. He was appointed surgeon to the Royal Infirmary of Glasgow, accompanied the British forces as a civil surgeon during the Crimean War, was chosen vice-president of the surgical section of the British Medical Association in 1872, and president of the same in 1888. From 1874 he was professor of clinical surgery in the University of Glasgow, but in 1900 resigned the chair. He edited the tenth edition of the *Anatomist's Vade Mecum*, and published *On Lithotrity* (1880), *Talipes Varus* (1880), and other technical works, and an important article entitled "Anæsthesia Jubilee: a Retrospect" (1897) in the *Edinburgh Medical Journal*.

BUCHANAN, James (1791-1868). The fifteenth President of the United States (1857-1861). He was born near Mercersburg, Pa., April 23, 1791, graduated at Dickinson College in 1809, was educated for the bar, and began to practice law in Lancaster, Pa., in 1812. Though a professed Federalist, he served as a private in the second war with England. In 1814, as also in 1815, he was a member of the Pennsylvania Legislature, and in 1820 was elected to Congress, where he served through five terms. In 1828 he favored Jackson for President, and in the Congress of 1829-1831 made important proposals as chairman of the Committee on the Judiciary. After leaving Congress he was sent by Jackson as Minister to Russia, where he concluded the first commercial treaty between the two countries, securing valuable privileges in the Black and Baltic seas. Returning home in 1833, he was in the following year chosen to the United States Senate, to which he was twice reëlected. He uniformly supported Jackson, especially in the latter's claim that as President he had power to remove executive officers without reference to the Senate, and in his financial measures.

When it was proposed to exclude from Congress petitions for the abolition of slavery, Buchanan upheld the right of petition, but declared that Congress had no control over slavery in the States, and that petitions for the abolition of slavery in the District of Columbia should be uniformly rejected. He favored the bill prohibiting the use of the mails for the distribution of abolitionist literature. He supported the 'expunging resolution' of Senator Benton, and in the affair of the American claims on France he supported Jackson's emphatic demand for payment, and his implied threat of war in case of a persistent refusal on the part of the French Government. During Van Buren's administration Buchanan supported the independent treasury scheme and favored the preëmption of public lands.

He sustained the veto power under Tyler, and opposed the ratification of the Ashburton Treaty, which settled the dispute concerning the northeastern boundary. When the question of the annexation of Texas came to the Senate, Buchanan was the only member of the Senate Committee of Foreign Affairs to report in favor of annexation. He had declined the office of Attorney-General in 1839, and in 1844 was mentioned for the Presidency. Finally he left the Senate in 1845 to become Polk's Secretary of State. In this capacity he had to deal with the northwestern boundary question, whence arose the famous partisan cry "54° 40′ or fight." Both England and the United States had formally claimed the territory between the Pacific Coast and the Rocky Mountains up to the Russian boundary, but after much negotiation the line of 49° was agreed upon. During the war with Mexico Buchanan was successful in avoiding or preventing the interference of other nations. He was in private life during the discussion and adoption of the Compromise Measures of 1850, but fully approved them. When Pierce became President, in 1853, Buchanan was sent as Minister to Great Britain, where he was engaged in endeavors to settle a series of questions concerning Central American affairs. With J. Y. Mason and Pierre Soulé, he signed the Ostend Manifesto (q. v.), recommending the acquisition of Cuba, but although the measure was so evidently pro-slavery in tendency and unjust to Spain that it met with the disapproval of Marcy, the Secretary of State, nevertheless it helped Buchanan to gain the Democratic nomination for President, while his absence in England during the Kansas-Nebraska excitement was also in his favor, and he was nominated in 1856. The electoral vote was: For Buchanan, 174; for John C. Frémont (candidate of the newly organized Republican Party), 114; for Millard Fillmore (Native American), 8. The popular vote was: Buchanan, 1,838,169; Frémont, 1,341,264; Fillmore, 874,534; majority against Buchanan, 377,-

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629; plurality for him, 496,905. He had the votes of every slaveholding State except Maryland, which went for Fillmore. The vote also gave Buchanan Indiana, Illinois, Pennsylvania, California, and New Jersey. In the executive chair he was uniformly subservient to Southern politicians, and allowed their threats of secession to influence his actions. Among other acts of his administration was the temporary suppression of the Mormon troubles and the vetoing of the Homestead Bill. After Lincoln's election Buchanan was more than ever anxious to stifle the slavery discussion, and in his last message to Congress pointedly charged the North with having brought about the existing crisis in national affairs by a discussion which had "produced its malign influence on the slaves, and inspired them with a vague idea of freedom." While holding that the States had no right to secede, he weakly added that the nation had no power to prevent it; for it could not employ force, he said, except upon the demand of the lawful authorities of the State, and in South Carolina no such authority then existed. A few days later he was confronted by commissioners from South Carolina (that State having passed an act of secession on December 20, 1860), who came to demand the surrender by the President to the seceded State of all public property, and to negotiate for the continuance of 'peace and amity between that Commonwealth and the Government at Washington.' His reply was that he had no power, and could only refer the matter to Congress; he could only receive them as 'private gentlemen of the highest character,' and treat respectfully such propositions as they might make. He did, however, decline to accede to their demand for the removal of the troops from Charleston Harbor. The Cabinet was immediately reorganized. Cass was Secretary of State, but resigned when the President refused to order reinforcements to the Charleston ports; the Secretary of the Treasury and the Secretary of the Interior had already gone, and the Secretary of War also resigned. Under the influence of the reorganized Cabinet, including J. S. Black, John A. Dix, J. Holt, and E. M. Stanton, Buchanan displayed less timidity, attempted a reinforcement of Sumter, refused to surrender the United States property to South Carolina, and announced his intention to protect it if assailed, measures which gained for his administration, during its last months, more of the confidence of the nation. After the accession of Lincoln Mr. Buchanan wrote to John A. Dix: "The present administration had no alternative but to accept the war initiated by South Carolina or the Southern Confederacy. The North will sustain the administration almost to a man, and it ought to be sustained at all hazards."

Buchanan's administration was marked by considerable activity in diplomatic affairs. He secured a satisfactory commercial treaty with China and the recognition by England of the rights of neutral ships. Relations with Mexico continued to be important as well as unsatisfactory. In his attitude toward the struggle in Kansas and his action upon the Lecompton Constitution (q. v.) Buchanan subjected himself to severe criticism. Shortly after his retirement, he published what may be termed a defense, entitled *Mr. Buchanan's Administration on the Eve of the Rebellion* (New York, 1866). The chief authority for his life is the *Memoir* by George Ticknor Curtis (2 vols., New York, 1883). In 1888 the messages of Mr. Buchanan were collected and published by J. Buchanan Henry, with an appendix containing a number of letters from members of his Cabinet at the close of his Presidential term (New York, 1888). He died in Lancaster, Pa., June 1, 1868. See UNITED STATES.

BUCHANAN, ROBERT CHRISTIE (1811-78). An American soldier. He was born in Baltimore, Md.; graduated at West Point in 1830; took part as second lieutenant in the Black Hawk War of 1832, being in command of the gunboats on the Wisconsin during the battle of Bad Axe River; and in 1837-38 served in the Florida, or Seminole, War. In the Mexican War he participated in both the Northern and the Southern campaigns, and was brevetted major and lieutenant-colonel, respectively, for gallantry at Palo Alto and Molino del Rey. Soon after the outbreak of the Civil War he was promoted to be lieutenant-colonel, and in 1862 commanded a regiment, and later a brigade in the Peninsular Campaign. From November, 1862, to March, 1863, he served as a brigadier-general of volunteers in the Rappahannock campaign, and at the close of the war he was brevetted brigadier-general in the regular army for gallantry in the battle of Malvern Hill, and major-general for gallantry in the second battle of Bull Run and the battle of Fredericksburg. He commanded the District of Louisiana from January, 1868, to January, 1869, and the Department of Louisiana from January to March, 1869; and in 1870 retired from the service.

BUCHANAN, ROBERT WILLIAM (1841-1901). An English poet, dramatist, and novelist. He was born in Caverswall, Staffordshire, was educated at the University of Glasgow, shared hardships in London with the promising Scotch poet David Gray (q.v.), and gradually became known as a journalist. His first publication, *Undertones*, a collection of verse, appeared in 1862, and was followed in 1865 by *Idylls and Legends of Inverburn*, and in 1866 by *London Poems*. In 1869 he gave in London a series of selected readings from his poems, complete editions of which were published in 1874 (3 vols.), and 1885 (1 vol.). He early essayed the drama, in which field his most noteworthy success was *Sophia*, a skillful adaptation of *Tom Jones;* and from 1876 wrote a number of novels, such as *God and the Man* (1881). In 1880 he visited America. In verse he displayed at his best an unstudied strength of genius, but by degrees grew definitely assertive and painfully egoistic, as he is, for example, in *The Wandering Jew* (1893). As a critic, he was indeed acute and sincere; but in his judgments was by many accused of the same bias and intolerance which disfigured the art of his later poetry. Two reviews by him, "The Fleshly School of Poetry: D. G. Rossetti" (in the *Contemporary Review* for October, 1871, with the signature Thomas Maitland) and "The Voice of the 'Hooligan'" (an arraignment of Rudyard Kipling, in the *Contemporary* for December, 1899), evoked much controversy. It has been said that his chief defect was one of taste; he was qualified for creative work, but he preferred critical aggressiveness.

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BUCHANITES, bŭk'-*an*-īts. An extraordinary sect of fanatics, which sprang up in the west of Scotland in 1783, but has now become extinct. The founder of the sect was Elspeth Simpson, the daughter of John Simpson and Margaret Gordon, and she was born at Fatmacken, near Banff, northeast Scotland, where her father kept an inn, in 1738. She married Robert Buchan, a potter of Greenock, but not being happy with him, she removed with her children to Glasgow in 1781, and subsequently was divorced from him. In Glasgow, in 1783, she became acquainted with the Rev. Hugh White, minister of the Relief congregation in Irvine, 10 miles north of Ayr, a weak, vain man, and coarse declamatory preacher, and moved to Irvine to be in his congregation. She converted him and his wife to the belief that she was the woman mentioned in Rev. xii., and that he was the man child whom the woman bare! She also claimed to be able to impart the Holy Ghost by breathing. A little company of believers in their claims, and others of like nature, was collected. Then the customary persecutions began and the customary village gossip that their meetings were licentious orgies. Robert Burns, in a letter to J. Burness in August, 1784, repeats the tale. White was deposed from the ministry and the company banished from the burgh. They went about 50 miles southeast and settled at New Cample, 10 miles north by west of Dumfries. There Mrs. Buchan died in May, 1791. The sect, which never numbered more than a handful, became extinct in 1848. Consult Train, *The Buchanites from First to Last* (Edinburgh, 1846).

BUCHAREST, or **BUKHAREST**, bōō'kȧ-rĕst'. The capital of Rumania, situated on both sides of the Dimbovitza, in latitude 44° 25′ N. and longitude 26° 7′ E. (Map: Balkan Peninsula, F 2). The two parts of the city are connected by twelve bridges, five of iron and seven of stone. The general appearance of the city, with its green gardens and numerous church cupolas, is very attractive, although many of the streets are narrow and crooked, still retaining some of their Oriental characteristics. These streets, however, are confined mostly to the suburbs, and the city itself is practically modern. The fortifications of Bucharest, completed in 1896, are very extensive and formidable, containing eighteen forts and forming a circle of over 40 miles in circumference around the city. The chief streets, such as the Boulevard, Calea, Victorie, Lipscani, and Karlstrasse, are well laid out, and lined with numerous fine buildings. Bucharest contains over 120 churches, mostly Greek Orthodox. The most prominent secular buildings of the capital are the royal palace, the university, the national theatre, the palace of justice, and a number of other Government buildings, besides numerous private palaces. Bucharest has a number of fine monuments, including one to Joan Heliade-Radulescu, the father of Rumanian literature, and one to the Waywode Michael the Brave.

Industrially Bucharest is of comparatively little importance. Most of the manufacturing establishments are in the hands of Germans and Hungarians, and the production is only slightly above the local demand. The chief manufacturing products are flour, beer, soap, candles, brick, some textiles, and iron articles. The commerce is more developed, and a considerable part of the imports of Rumania come to Bucharest.

Bucharest is administered by a town council, consisting of seventeen members. The water-supply and the sewers are inadequate, and most of the streets are lighted by gas, while there are still some lighted by oil. Electricity is used only for illuminating the royal palace and the larger public buildings. For local transportation there are a number of horse-car lines and one electric railway.

The chief educational institutions are the university; the veterinary institute; the Rumanian Academy, with valuable collections and a library; the museum of zoölogy, anthropology, and ethnology; the botanical museum; the museum of antiquities; and the Rumania Geographical Society. The charitable institutions are very numerous, and include ten public hospitals, a number of poorhouses, and kitchens for the poor. The population was 282,071 in 1899. Over 200,000 are Greek Orthodox, over 43,000 Jews, and the rest Roman Catholics, Protestants, Mohammedans, and Armenians.

Bucharest became the residence of the Princes of Wallachia at the end of the Fourteenth Century. It was taken by the Austrians in 1789, and held for two years. The town has suffered greatly from pests and earthquakes. On May 28, 1812, a treaty was concluded here between Russia and Turkey, by which the former obtained Bessarabia, the Pruth being made the boundary between the two empires. In 1862 Bucharest became the capital of Rumania.

BUCHAREST, University of. The State university of Rumania. It was founded in 1864, and in 1902 had over 4300 students in mathematics and science, philosophy, law, medicine, and theology. It comprises, also, a school of pharmacy and a number of laboratories and museums. The library contains about 11,000 volumes.

BÜCHELER, bụk'*e*-lĕr, Franz (1837—). A German philologist. He was born in Rheinberg, studied in Bonn, became professor in Freiburg in 1858 and in Greifswald in 1866, and in 1870 was called to Bonn. His investigations in the department of ancient Italian dialects are very valuable. Especially important is his *Grundriss der lateinischen Deklination* (1866; a new edition by Windekilde, with the admirable additions of the French translator, Havet, in 1879). He also published editions of Frontinus, *De Aquis Urbis Romæ* (1858); *Petronius* (1862); the *Hymnus Cereris Homericus* (1869); the *Reliquiæ* of Quintius Cicero (1869); and *Herondæ Mimiambi* (1892). In 1878 he became one of the associate editors of the *Rheinisches Museum für Philologie*. He is renowned equally for his great learning and his discriminating critical talent.

BUCHER, bōōg'ĕr, Anton von (1746-1817). A German author, known for his polemics against the Jesuits and for his labors in behalf of the German schools. He was born in Munich, studied in Ingoldstadt, and took orders. In 1771 he was appointed rector of the German schools of Munich. He was bitterly antagonized by the Jesuits, and finally was removed from his position (1778) by Maximilian Joseph II., who, however, compensated him by bestowing upon him the benefice of Engelbrechtsmünster. Here he

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published his satires against the Jesuits, such as *Chanfriebágysprozession*, *Spottspiel von der Sündflut*, and *Die Jesuiten auf dem Lande*. His collected works were published in 1819-20.

BUCHER, LOTHAR (1817-92). A German diplomat, born in Neustettin (Pomerania). He was educated at the University of Berlin, and in 1848 entered the Prussian National Assembly for the city and district of Stolp. In 1850, under political charges, he fled to England, where he acted as correspondent for the *National Zeitung*. After his return to Germany he was appointed by Bismarck to a post in the Foreign Office, and obtained the rank of reporting councilor in the Ministry for Foreign Affairs. He was for many years the confidential assistant of Bismarck in diplomatic affairs, and accompanied the Chancellor during the peace negotiations with France. In 1876 he was made a Privy Councilor. His publications include *Bilder aus der Fremde* (2 vols., 1862-63), a selection from his contributions to the *National Zeitung*, and *Kleine Schriften politischen Inhalts* (1893). Consult the *Leben und Werke*, by Poschinger (Berlin, 3 vols., 1890-94).

BUCHEZ, bụ'shā', PHILIPPE JOSEPH BENJAMIN (1796-1865). A French political and social philosopher. He was born in Matange-la-Petite (then in the Department of Ardennes, now in Belgium), studied medicine, was admitted to practice as a physician in 1825, and was interested, as an opponent of the Bourbon restoration, in the organization of the French Carbonari Society. The discovery of the conspiracy led to his arrest, and his release was obtained only by a disagreement among the judges. He then became chief editor of the *Journal des Progrès des Sciences et Institutions Médicales*, and a collaborator on the *Producteur*, a periodical in advocacy of the doctrines of Saint-Simon. Subsequently he withdrew from Saint-Simonism and founded *l'Européen*, later called *La Revue Nationale*, in which, as well as in his *Introduction à la science de l'histoire* (1833), he expounded his philosophical system, styled by himself 'Buchezism.' After the Revolution of 1848 he was for a short time deputy mayor of Paris, and was elected to the Constituent Assembly, of which he became president. His publications include the extensive compilation, *L'Histoire parlementaire de la Révolution française*, with Roux Lavergne (40 vols., 1833-38); *Essai d'un traité complet de philosophie au point de vue du catholicisme et du progrès* (1840); and *Histoire de la formation de la nationalité française* (1859).

BUCKHOLZ, bōōk'hōlts. A town of Saxony, Germany, on the river Sehma, 18 miles southeast of Chemnitz. Its principal building is the fine Gothic Church of Saint Catherine, which contains some good paintings. The town owes its origin to its silver-mines, discovered in 1497. It has important industries, including wood-pulp and paper-making mills, lace and embroidery mills, and bookbinding establishments. Population, in 1895, 7989.

BUCHHOLZ, bōōg'hōlts, REINHOLD (1837-76). A German zoölogist and traveler. He was born in Frankfort-on-the-Oder, and studied medicine in Greifswald and Berlin. After practicing a short time in Greifswald he gave up medicine for zoölogy, and spent some time in Italy, studying marine life. He accompanied the North Polar Expedition of the *Hansa* (1869-70), and in 1872 made an unsuccessful attempt to explore the mouths of the Niger. He became professor of zoölogy in Greifswald in 1872, and director of the zoölogical museum in 1876.

BUCHHOLZ FAMILY, THE (in Ger., Die *Familie Buchholz*). Entertaining sketches of middle-class life in Berlin by the German author Julius Stinde. They depict the petty interests and strivings of the family in a life-like and amusing fashion, and have been exceedingly popular in Germany, reaching the eighty-fifth edition in 1900. The books were greatly liked by Prince Bismarck, whose commendatory letter to the author is published in the later editions. The author pursued the same vein less successfully in *Wilhelmina Buchholz's Memoirs; The Buchholzes in Italy, Paris, the Orient*, etc.

BUCHLOË, bū'klō-ē. See BUFFALO GRASS.

BÜCHNER, bụk'nĕr, FRIEDRICH KARL CHRISTIAN LUDWIG (1824-99). A German philosophical writer, born in Darmstadt. He studied at the universities of Giessen, Strassburg, Würzburg, and Vienna, and for a time practiced medicine in his native city. In 1852 he was appointed a lecturer in Tübingen, but the publication in 1855 of his *Kraft und Stoff* compelled him to resign his post and resume medical practice in Darmstadt. In *Kraft und Stoff* (19th German ed., 1898; an English translation by Collingwood, 1855; a 2d Eng. from the 10th German ed., 1870) he maintained the indestructibility of matter and force—a doctrine now generally accepted by philosophers. But he likewise insisted on the finality of physical force, identifying brain and mind, and denying the existence in nature of either plan or deity. The book was scarcely original, and was soon discredited by thinkers; but in that it afforded many errors for correction, may have contributed something to permanent philosophic thought. Other works by this author are: *Aus Natur und Wissenschaft* (Vol. I., 1862; Vol. II., 1884); *Licht und Leben* (1881); *Fremdes und Eigenes aus dem geistigen Leben der Gegenwart* (1890); *Darwinismus und Socialismus* (1894); and *Im Dienste der Wahrheit* (1899). Consult: Frauenstädt, *Der Materialismus* (Leipzig, 1856), and Janet, *The Materialism of the Present Day: A Criticism of Dr. Büchner's System*, translated by Masson (London, 1867).

BÜCHNER, GEORG (1813-37). A German poet, brother of the preceding, born in Goddelau, Hesse. He studied at the universities of Strassburg and Giessen. Because of the publication of a brochure on behalf of political liberty, entitled *Der hessische Landbote*, he was compelled to take refuge in Strassburg. Later he went to Zurich, where he became lecturer at the university, and where he died. His powerful dramatic poem, *Danton's Tod*, appeared in 1835. He also made translations from Hugo, and left in MS. a *Geschichte der philosophischen Systeme von Cartesius bis Spinoza*.

BUCHNER, bōōg'nĕr, HANS (1850—). A German hygienist and bacteriologist. He was born in Munich, studied at the universities of Munich and Leipzig, and at the former became in 1880 lecturer on hygiene, and in 1892 professor. His investigations in the field of bacteriology are numerous and important. In 1877

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he demonstrated the resistance offered by the physical organism to microscopic bodies present in states of ulceration, inflammation, and fever; and in 1890 showed this resistance directly to depend upon the presence in the blood-serum of certain clearly defined albuminous substances.

BUCHNER, JOHANN ANDREAS (1783-1852). A German pharmacist, born in Munich. He studied pharmacy under Trommsdorff in Erfurt, and in 1818 was appointed professor of pharmacy, toxicology, and the theory of prescription at the University of Landshut. This chair he retained upon the transfer of the university to Munich in 1826. In 1827 he became a member of the Bavarian Academy of Sciences. From 1815 to 1851 he published 110 volumes of his *Reportorium für Pharmacie,* then the most widely circulated periodical of the sort in Germany, and in 1815-18 edited the *Anzeiger für Kunst und Gewerbfleiss in Bayern.* He discovered salicin and berberine (qq.v.), and by his writings greatly aided in the establishment of pharmacy upon a scientific basis. His chief publication was the uncompleted *Inbegriff der Pharmacie* (1821-36), to which other scientists contributed, and for which he himself wrote an *Einleitung in die Pharmacie* (1821); *Toxikologie* (1822); *Grundriss der Physik als Vorbereitung zur Chemie* (1823); and *Grundriss der Chemie* (1830-36).

BUCHON, bü'shôn', JEAN ALEXANDRE (1791-1846). A French historian, born at Menetou-Salon (Cher). After extensive travels for the collection of material, he published, in 1824-26, his edition of the *Chroniques de Froissart* (15 vols.), a portion of his *Collection des chroniques nationales françaises écrites en langue vulgaire du XIIIe au XVIe siècle* (47 vols., 1824-29). In addition to some volumes of travel, such as *La Grèce continentale et la Morée* (1843), his works include *Chroniques étrangères relatives aux expéditions françaises pendant le XIIIe siècle* (1840), *Esquisse des principaux faits de nos annales nationales du XIIIe au XVIIe siècle* (1840), and *Nouvelles recherches historiques sur la principauté française de Morée* (1845).

BUCHSWEILER, bōōgs'vī'lĕr. The capital of a canton in German Alsace, 20 miles northwest of Strassburg. It was the ancient capital of the 'Hanauer Ländschen,' part of Hesse-Darmstadt, prior to the French Revolution. It has some fine mediæval residences and public buildings, including the Rathaus and the gymnasium. The curious Bastberg Hill, the scene where numerous legendary myths are laid, is noted for its lignite-mines and fossils. Population, in 1900, 3101.

BUCHTA, bōōg'tä, RICHARD (1845-94). An Austrian explorer, born in Radlow, Galicia. In 1877 he visited Khartum, where Chinese Gordon, then Governor-General, facilitated his journey to Emin Pasha at Ladó, on the Upper Nile. In 1885 he made another tour through Egypt and journeyed through the desert to Fayum. He was a collaborator on the first volume of Junker's celebrated work on Africa, and published the following interesting works: *Die obern Nilländer,* etc., with 160 photographic views (1881); *Der Sudan und der Mahdi. Das Land, die Bewohner und der Aufstand* (1884); *Der Sudan unter ägyptischer Herrschaft* (1888).

BUCHTEL (bŭk'tel) **COLLEGE** (after John R. Buchtel, who gave it in aggregate about $500,000). A college founded by the Universalist State Convention of Ohio. It was opened at Akron, Ohio, in 1872. In 1901 the endowment was $150,000, and the value of the college buildings and grounds, $150,000. At this time the faculty numbered 17, and the students 282, of whom 92 were in the collegiate department.

BUCK, CARL DARLING (1866—). An American comparative philologist, born in Bucksport, Maine, October 2, 1866. He received the degrees of A.B., 1886, Ph.D., 1889, at Yale University. He is the author of *Vokalismus der oskischen Sprache* (1892); *The Oscan-Umbrian Verb System* (1895); joint author (with W. G. Hale) of *Latin Grammar* (1902); and a contributor to Vol. V. of the *Papers of the American School of Classical Studies* (Athens), *American Journal of Philology,* etc.

BUCK, CHARLES (1771-1815). An English independent minister. He is remembered for his *Collection of Anecdotes* (1799), and especially for his *Theological Dictionary* (2 vols., London, 1802), which was once one of the most widely used of religious reference books and repeatedly republished and reprinted in England and America. At the time of his death he was pastor in London.

BUCK, DUDLEY (1839—). An American organist and composer, born in Hartford, Conn., March 10, 1839. A commercial career was chosen for him, but he early showed such aptitude for music that his father allowed him to leave college, 1858, in order to prosecute his musical studies at the Leipzig Conservatory, under Richter, Hauptmann, and Rietz. Returning to the United States, 1862, he soon became noted as a musical leader, composer, and organist. He furnished the music for Lanier's cantata, sung at the opening of the Centennial exhibition, Philadelphia, 1876, and gained the prize of $1000 offered by the Cincinnati Musical Festival of 1880 for the best cantata, choosing Longfellow's *Golden Legend* as his text. His works include other cantatas, among them *King Olaf's Christmas; Voyage of Columbus; The Light of Asia;* and the series of five cantatas entitled *The Christian Year;* the comic opera, *Deseret;* the symphonic overture, *Marmion;* and organ-music.

BUCK-BEAN, or MARSH-TREFOIL (*Menyanthes trifoliata*). A plant of the natural order Gentianaceæ, the best-known species of its genus, widely distributed in all the colder parts of the Northern Hemisphere, and common in America. It has been described as 'perhaps the most beautiful' of all British plants. It grows in marshy places, its creeping rootstalks (or rhizomes) and densely matted roots often rendering boggy ground firm. The leaves are ternate, like those of the trefoils or clovers, and are supported on pretty long stalks. The flower-stalk, which is about a foot high, bears a compound raceme of ten to twenty white flowers, externally tipped with red. The leaves are destitute of smell, but very bitter. From them is prepared a valuable bitter extract, menyanthin, which has long been used in cases of dyspepsia and disorders of the bowels, and which was also formerly employed in intermittent fevers. An infusion is also sometimes used, and sometimes the dried and powdered leaves. The whole plant seems to possess the same bitter and tonic properties. It is sometimes used in Germany as a substitute for hops.

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The rootstock, which is black and jointed, contains a considerable quantity of starch. For illustration, see BRAZILNUT.

BUCKBOARD (probably so called because of its *bucking* or bouncing). A four-wheeled vehicle in which a long elastic board or platform is used in place of the ordinary body, springs, and gear. It is fixed as a connection between the fore and rear axles, and may have one or more seats. It is thus the most simply constructed of any four-wheeled vehicle. Buckboards were first used only in mountain districts where the roads are rugged, and were for a long time

BUCKBOARD.

rudely and simply built. When the Adirondack region and Mount Desert became fashionable resorts, the summer visitors to these places had the primitive buckboards reproduced in more elegant form by carriage-builders, so that the buckboard now usually seen differs greatly from the model, being made in handsome woods of a light color, ash or hickory, with springs, silver mountings, and cushions of russet leather.

BÜCKEBURG, bŭk'*e*-bōōrk. A garrison town, capital of Schaumburg-Lippe, northern Germany, 30 miles southwest of Hanover (Map: Germany, C 2). Its chief features are a ducal palace and castle, a Seventeenth Century Lutheran church, and a fine park. Population, in 1900, 5632.

BUCKET (origin uncertain). The name given in mechanics to the vanes of a water-wheel, or to the scoop of a dredge or of an elevator for handling grain, coal, etc. See WATER-WHEEL; DREDGES; GRAIN-ELEVATOR. Buckets for mechanical purposes are made of wood, cast iron, and sheet steel or other metals.

BUCKEYE. See HORSE-CHESTNUT.

BUCKEYE STATE. Ohio. See STATES, POPULAR NAMES OF.

BUCK'HAM, MATTHEW HENRY (1832—). An American educator, born in Leicestershire, England. He graduated at the University of Vermont in 1851; was appointed professor of Greek and became president of the institution in 1871.

BUCKHANNON, bŭk-ăn'*an*. A town and county-seat of Upshur County, W. Va., 40 miles south of Clarksburg, on the Buckhannon River and on the Baltimore and Ohio Railroad (Map: West Virginia, D 3). It is the seat of the West Virginia Conference Seminary (co-educational); and has flour, lumber, and woolen mills, tannery, etc. Population, in 1890, 1403; in 1900, 1589.

BUCKHOUND. See HOUND.

BUCKINGHAM, bŭk'ĭng-*am*, DUKES OF. See VILLIERS.

BUCKIE. A seaport and police burgh of Banffshire, Scotland, on the North Sea, near the entrance to the Moray Firth, 13 miles northeast of Elgin by rail. It has a fine Roman Catholic church with a painting of Saint Gregory by one of the Caracci, and there are numerous fine residences in the vicinity. A good modern harbor affords facilities for its fishing industries, which are the most important of the surrounding district. Population, in 1891, 5834; in 1901, 6541.

BUCKINGHAM, JAMES SILK (1786-1855). An English traveler and editor. He was born in Flushing, near Falmouth, Cornwall, and at ten years of age went to sea. In 1818 he established the *Calcutta Journal*, which was a commercial success, but because of its strictures on the Indian Government was suppressed, while he, himself, was expelled from the Presidency of Bengal. His lectures, on his return to England, against the East India Company's monopoly, and in support of opening the trade to China, tended greatly to direct public attention to the subject. In London, he established the *Oriental Herald* in 1824, and in 1828 the *Athenæum*, now one of the leading weekly critical journals of England. Subsequently he traveled through the United States, and from 1832 to 1837 was a member of Parliament from Sheffield. He was projector and secretary of the British and Foreign Institute from 1843 to 1846, and president of the London Temperance League. He was the author of numerous works of travel on the Continent, in the East, and in America, and at the time of his death was engaged on an *Autobiography*, two volumes of which were published (London, 1855).

BUCKINGHAM, JOSEPH TINKER (1779-1861). An American journalist. He was born in Connecticut, was bred a printer, and in 1800 went to Boston, where, six years later, he began *The Polyanthus*, a monthly magazine, which was soon suspended, but was resumed in 1812. In 1809 he published a weekly called *The Ordeal*; from 1817 to 1828 *The New England Galaxy and Masonic Magazine*; and during 1831-34 *The New England Magazine*. In 1824 he established the *Boston Courier*, of which he was editor until 1848. He published *Specimens of Newspaper Literature, with Personal Memoirs, Anecdotes, and Reminiscences* (1850), and *Personal Memoirs and Recollections of Editorial Life* (1852).

BUCKINGHAM, WILLIAM ALFRED (1804-75). An American politician, best known as the 'war Governor' of Connecticut. He was born in Lebanon, Conn.; received a common-school education; taught school; worked on his father's farm; and in 1825 began business for himself in Norwich, ultimately accumulating a considerable fortune as a dry-goods merchant and a manufacturer, first of carpets and afterwards of india-rubber. He took an active interest in politics; was elected mayor of Norwich in 1849, 1850, 1856, and 1857; and from 1858 to 1866, when he declined renomination, was Governor of Connecticut. His term thus included the period of the Civil War, and he became widely known as one of the ablest and most energetic of the 'war Governors,' actively upholding the Administration throughout, and exerting himself to the utmost to raise and equip troops. In September, 1862, he wrote to the President, "This little State has already sent into the army, and has now at the rendezvous, more than one-half of her able-bodied men between the ages of 18 and 45 years, and has more to offer if wanted;" and, largely owing to his influence,

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Connecticut sent into the field, before the close of the war, nearly 55,000 men out of a population which numbered only between 460,000 and 465,000 souls. From 1869 until his death, Buckingham was a member of the United States Senate. He took an active interest in temperance reform, serving for some time as president of the American Temperance Union, and in addition was an influential member of the American Board of Commissioners for Foreign Missions, and president of the first National Congregational Council. He gave $25,000 to the Yale Theological Seminary, and was a liberal contributor to various philanthropic enterprises. Consult Mrs. Stowe, *Men of Our Times* (New York, 1868).

BUCKINGHAM AND NOR'MANBY, JOHN SHEFFIELD, Duke of (1649-1721). An English naval officer, politician, and author. He was privately educated, in 1666 and 1672 enlisted as a naval volunteer in the wars against the Dutch, in 1673, was appointed to the command of a ship, and in the same year to the colonelcy of an infantry regiment. In 1680 he commanded a successful expedition to relieve Tangier, then besieged by the Moors. He became, in 1685, Lord Chamberlain to James II., in 1694 cabinet councilor to William III., and in 1702, at the accession of Anne, Lord Privy Seal. In 1705 he was obliged by Whig hostility to resign his offices, but in 1710 was appointed Lord Steward of the Household, and in 1711 Lord President of the Council. He out-Cibbered Cibber by rewriting Shakespeare's *Julius Cæsar*, which he divided into two tragedies, called, respectively, *Julius Cæsar* and *Marcus Brutus*. His poems were much praised by contemporaries, including Pope and Dryden; but, to quote Dr. Johnson (*Lives of the Poets*), "criticism is no longer softened by his bounties or awed by his splendor, and . . . discovers him to be a writer that sometimes glimmers, but rarely shines. . . ." His *Essay on Satire*, containing an attack on Rochester, was by that penetrative worthy attributed to Dryden, who was in consequence severely beaten by ruffians, at his instigation, in the public street. The collected works, comprising, besides the poems, historical memoirs, speeches, and other miscellanies, were edited by Pope (London, 1723).

BUCKINGHAMSHIRE. A south-midland county of England (Map: England, F 5). Area, 743 square miles. The soil is good, chalk and clay predominating. About half the county is under tillage, the rest is in meadow and pasture. Wheat and beans are the principal crops. The chief dairy product is butter. In the vale of Aylesbury, fattening of cattle is extensively carried on; the sheep are noted for fine and heavy fleeces, and large numbers of ducks are reared for metropolitan consumption. The Chiltern Hills are in the northern portion, where there are woods of considerable extent. The chief manufactures are paper, straw-plait, and thread lace. The chief rivers are the Thames, bordering the county on the southwest, the Ouse, the Ousel, Colle, and Thame, the latter two flowing into the Thames. The Grand Junction Canal, and the Great Western and Northwestern railways intersect the county on the east and south. Chief towns, Aylesbury, Buckingham, Marlow, and Wycombe. Buckinghamshire formed part of the ancient kingdom of Mercia; it contains British and Roman remains, such as traces of Watling, Ickneld, and Akeman streets or roads. Many events of historical interest occurred in this county. It was the scene of contest in the civil war of Stephen and John. Population, in 1891, 185,284; in 1901, 195,234.

BUCK'LAND, FRANCIS TREVELYAN (1826-80). An English naturalist, the son of William Buckland (q.v.), canon of Christ Church, Oxford. He was educated at Winchester School, and at Christ Church College, Oxford; devoted himself to the study of medicine; was house surgeon for a time at Saint George's Hospital, London; and was appointed assistant surgeon to the Second Life Guards in 1854, retiring in 1863. From his boyhood he was an enthusiastic student of natural history. He contributed numerous papers to *Field* and *Land and Water* (which he established in 1866), and was the author of *Curiosities of Natural History* (4 vols., 1857-72); *Fish Hatching* (1863); *Logbook of a Fisherman and Zoölogist* (1876); *Natural History of British Fishes* (1881); an edition of White's *Natural History of Selborne*, with notes (1876); and numerous official reports as inspector of fisheries. He was an acute observer, and his writings on subjects of natural history exhibit in great part the results of fresh and original observations, which his sprightly style presents in an interesting manner. He took a great interest in fish-culture, and about 1865, at his own cost, established at South Kensington a 'museum of economical fish-culture,' illustrated by models and casts largely made with his own hands. This at length expanded into the International Fisheries Exhibition of 1883. For his life, consult Bompas (London, 1883).

BUCKLAND, WILLIAM (1784-1856). A distinguished British geologist, born in Axminster, Devonshire. He was educated in Winchester and Oxford, and in 1813 he received an appointment as reader of mineralogy in Oxford University, and was elected a fellow of the Geological Society of London, of which he was twice president. In 1825 he was appointed a canon of Christ Church, Oxford, and in 1845 he became Dean of Westminster. He contributed many valuable papers to geological publications, for one of which he received the Copley Medal. His most extended work, *Geology and Mineralogy Considered with Reference to Natural Theology*, was first published in 1836, as a Bridgewater treatise, and subsequently passed through three editions.

BUCKLAN'DIA (after the English naturalist Buckland). A magnificent and beautiful evergreen tree of the order Hamamelidaceæ, a native of the mountains of Java and India. The only species, *Bucklandia populnea*, is said to grow unbranched to the height of 40 feet, the trunk sometimes 21 feet in girth at 5 feet from the ground. The foliage is thick, bright, and glossy. The timber is valuable. See WITCH-HAZEL.

BUCK'LAW, LAIRD OF. The title of the husband of Lucy Ashton in Scott's *Bride of Lammermoor* (q.v.). He is the innocent cause of the tragic conclusion of the story. He is a good-natured youth, in spite of loose habits, and impresses the reader as more sinned against than sinning. His family name is Frank Hayston.

BUCKLE (Fr. *boucle*, buckle, earring, from Lat. *buccula*, the beaver of a helmet). A metal

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clasp, consisting of a rim and tongue, used for fastening straps or bands in dress and harness. Buckles for harness and men's clothing are usually stamped or drop-forged from iron or brass; but in making buckles for women's girdles and other articles of dress, the precious metals, often ornamented with gems and of ornamental design, are also employed. The use of buckles instead of shoestrings was introduced into England during the reign of Charles II. They soon became very fashionable, attained an enormous size (the largest being called Artois buckles, after the Comte d'Artois, brother of the King of France), and were usually made of silver, set with diamonds and other precious stones. In the latter half of the Eighteenth Century the manufacture of buckles was carried on most extensively in Birmingham, there being at one time not less than 4000 people employed in that town and its vicinity, who turned out 2,500,000 pairs of buckles annually. When the trade was at its height, however, fashion changed, and in 1791 the buckle-makers petitioned the Prince of Wales for sympathy, on the ground that the introduction of shoestrings had nearly ruined their trade. The Prince promised to assist them as far as he could, by wearing buckles himself and enjoining his household to do the same; but fashion was too strong even for him, and they became almost extinct, except as a part of the English Court dress.

BUCKLE, Henry Thomas (1821-62). An English historian, who became famous upon the publication of the first volume of the work entitled *The History of Civilization*. He was born at Lee, Kent, November 24, 1821, and came of a well-known London family of merchants and ship-owners. He was a delicate child, and after a short session at a school in Kentish Town his further studies, at his request, were pursued at home, under the direction of his father and mother. In his thirty-first year he had a knowledge of nineteen modern languages. The death of his father in 1840 left him an independent fortune, which enabled him to travel and devote himself to literature. From 1840 to 1844 he traveled in Europe, and it was during this period that he resolved to write a history of the Middle Ages. In 1851 he enlarged the scope of his work, and during the next six years was engaged in writing, rewriting, altering, and revising the first volume of his *History of Civilization*, which appeared in 1857. It achieved immediate success throughout Europe and America. Buckle was elected a member of various exclusive clubs, and on March 19, 1858, the first and only lecture that he ever delivered was given at the Royal Institute. His topic was "The Influence of Women on the Progress of Knowledge." This lecture was published in *Fraser's Magazine* (London, April, 1858). The second volume of his *History of Civilization* appeared in January, 1861, and he then sought recuperation in travel through the Orient. He contracted typhus fever at Nazareth, and died at Damascus, May 29, 1862, in his forty-first year.

Buckle's fame has diminished rather than increased with age, and critical estimates of his work vary as to its value. His great work is in reality an unfinished introduction, which seeks to establish history as an exact science, by a novel method of study and deduction. Before tracing the particular history of English civilization, he enters into a general consideration of the progress of those countries—Great Britain, Germany, France, Spain, and the United States—in which the elements of modern civilization originated. The two volumes are occupied with this preliminary examination, which they do not even complete. His objects, however, are clear. By ingenious but non-conclusive evidence he maintains that climate, soil, food, and the mutabilities of nature form the character of a people; that skepticism is the true source of intellectual progress; that the retarding force is credulity; and that the excessive protection exercised by governments, the nobility, the Church, and other agencies over the people, has dwarfed and retarded the spirit of freedom and civilization. His work is characterized by high ideals, vigor, and elegance of style; but although his arguments are admitted to contain much sound truth, he is accused of being frequently one-sided, and of drawing sweeping deductions from an imperfect survey of facts. Consult: *Miscellaneous and Posthumous Works of H. T. Buckle*, edited by Miss Taylor (London, 1872; new edition by Grant Allen, 1885); Huth, *Life of Buckle* (London, 1880); Robertson, *Buckle and His Critics* (London, 1895).

BUCKLER (Fr. *bouclier*, so named from the boss, *boucle*, on it). In old armor, a kind of shield worn on the left arm. The name is sometimes applied to the smaller ancient shields. In the Middle Ages the buckler was round, oval, or square in shape, and was frequently made of wickerwork or of hide, strengthened by metal plates.

BUCKLEY, James Monroe (1836—). An American clergyman. He was born in Rahway, N. J., was educated at Pennington Seminary and Wesleyan University, and studied theology in Exeter, N. H. He entered the ministry in 1858, joined the New Hampshire Conference of the Methodist Episcopal Church in 1859, and preached successively in Dover, Manchester, Concord, Detroit, New York, and Brooklyn, holding the last charge from 1867 to 1880. Since 1872 he has always been prominent in the General Conferences of his Church, and is one of the most influential men in the denomination. He has been editor of the New York *Christian Advocate* since 1880. Among his publications are: *Christians and the Theatre* (1876); *Oats or Wild Oats* (1885); *The Land of the Czar and the Nihilist* (1886); *Faith Healing* (1892); *Travels in Three Continents* (1895); and *Extemporaneous Oratory* (1899).

BUCKLEY, Samuel Botsford (1809-84). An American naturalist, born in Torrey, Yates County, N. Y. He graduated at Wesleyan University in 1836, and in 1842 traveled through the Southern States, where he discovered twenty-four new species of plants and the genus now known as *Buckleya distichophilla*. During a subsequent expedition through Florida, he discovered thirteen new species of shells. By barometrical measurements he determined in 1858 the height of several mountains in North Carolina and Tennessee; one of which, Mount Buckley, in North Carolina, was named after him. He afterwards successively became assistant naturalist and geologist in the State Survey of Texas (1860-61), State Geologist of Texas (1866-67), and scientific

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editor of the *State Gazette*, Austin (1871-72). A list of scientific papers written by him is contained in the *Alumni Record of Wesleyan University* (1883).

BUCK'MAN, JAMES (1814-84). An English geologist. He was born in Cheltenham, studied in London, and in 1842 was appointed curator of the Birmingham Philosophical Institute. From 1847 to 1863 he was professor in the Cirencester Agricultural College. He wrote on agricultural botany, archæology, and geology, his geological papers treating chiefly of the stratigraphy and paleontology of the Jurassic series of Somerset, Dorset, and other English districts with which he was familiar.

BUCK'MINSTER, JOSEPH STEVENS (1784-1812). An American Congregational clergyman. He graduated at Harvard in 1800, and was afterwards a teacher in Phillips Exeter Academy, where Daniel Webster was one of his pupils. In 1804 he was made pastor of Brattle Street Church, Boston; in 1808 he supervised the publication of Griesbach's *New Testament* (in Greek), and in 1811 he was appointed first lecturer on biblical criticism at Harvard. He belonged to the advanced literary Congregational school of his day, that, soon after his death, became Unitarian. He was a man of remarkable oratorical ability, and his sermons were finished literary productions. He was a member of the famous Anthology Club of Boston, and contributed to the *Monthly Anthology*. In 1839 his collected works were published in two volumes. Consult Lee, *Memoirs of the Buckminsters* (Boston, 1851).

BUCK'NELL UNIVERSITY (renamed in 1886, from The University at Lewisburg in honor of William Bucknell, its liberal benefactor). A Baptist Institution of Liberal Arts. It was founded in 1846, at Lewisburg, Pa. The endowment in 1901 was $425,000, and the value of the college buildings over $350,000. At the same time the faculty numbered 31, and the students 500, of whom one-third were in the preparatory departments. The presidents have been: Howard Malcolm, LL.D.; Justin R. Loomis, LL.D.; David J. Hill, LL.D.; and John Howard Harris, LL.D. (since 1889).

BUCK'NER, SIMON BOLIVAR (1823—). An American soldier and politician. He was born in Kentucky, graduated at West Point in 1844, and was assistant professor of geography, history, and ethics there in 1845-46. He then served in the Southern campaign under General Scott during the Mexican War, and received the brevets of first lieutenant and captain respectively for gallantry at Churubusco and Molino del Rey. From 1848 to 1850 he was again at West Point, as assistant instructor of infantry tactics, but resigned from the service in 1855, after which he practiced law, first in Illinois and then in Kentucky, where he is said to have been a prominent member of the Knights of the Golden Circle (q.v.). In 1860 he was made inspector-general of the State and commander of the Home Guards, and on the outbreak of the Civil War he became a brigadier-general in the Confederate service. He was the third officer in rank at Fort Donelson at the time of the attack of the Federal army and fleet early in 1862, and, Generals Floyd and Pillow withdrawing during the night of February 15, it devolved upon him to surrender the fort and garrison to General Grant. (See FORT HENRY AND FORT DONELSON.) In the following August he was exchanged, and subsequently commanded a division under Bragg in Tennessee, and, as major-general, took a conspicuous part in the battles of Murfreesboro and Chickamauga. On May 26, 1865, having previously attained the rank of lieutenant-general, he surrendered with Gen. Kirby Smith's army at Baton Rouge, La. After the close of the war he returned to Kentucky, and from 1887 to 1891 was Governor of the State. In 1896 he was the candidate of the National (Sound Money) Democrats for Vice-President of the United States on the ticket with J. M. Palmer (q.v.).

BUCK'NILL, Sir JOHN CHARLES (1817-97). An English alienist, born at Market Bosworth. He received his medical education at University College, London, and became councilor, censor, and Lumleian lecturer in the College of Physicians and Surgeons there. He originated, and for some time edited, the publications entitled *The Brain* and *The Journal of Medical Science*. Among his numerous works, the following are especially deserving of notice: *Unsoundness of Mind in Relation to Criminal Acts* (1857), a very valuable work; *The Psychology of Shakespeare* (1859); *The Medical Knowledge of Shakespeare* (1860); *Notes on American Asylums* (1876); *Care of the Insane and Their Legal Control* (1880).

BUCK'RAM (OF. *boquerant*, *bouqueran*, in popular etymology later referred to *buck*, Ger. *Bock*, goat). A coarse linen or cotton cloth, sized with glue. It is used as a stiffening in making clothing, and also in bookbinding. The name was originally applied to a more costly material, which was used for ecclesiastical purposes and for garments.

BUCKSHOT WAR. See PENNSYLVANIA.

BUCKSKIN. A term applied in America to deerskin or sheepskin made pliable by dressing it with oil or brains, and formerly used by the Indians and frontiersmen for clothing, but now consumed almost exclusively in the manufacture of gloves. In England, buckskin is used to denote a strong-twilled woolen fabric for breeches.

BUCKS'PORT. A town in Hancock County, Maine, 18 miles south of Bangor, on the Penobscot River, and a branch of the Maine Central Railroad (Map: Maine, F 6). It has a good harbor with water transportation throughout the year, and is engaged chiefly in shipbuilding, fishing, and leather-tanning. A United States salmon preserve is located in the adjoining town of Orland. Bucksport contains the Buck Memorial Library, and the East Maine Conference Seminary. It was settled in 1762, and incorporated in 1792. The government is administered by town meetings, which convene annually. Population, in 1890, 2921; in 1900, 2339.

BUCK'STONE, JOHN BALDWIN (1802-79). An English comedian and dramatic writer, born September 14, 1802, at Hoxton, London. Preferring the excitement of the stage to the monotony of an attorney's office, he found an opportunity in a provincial town for the display of his theatrical abilities. After a probation in the country, he appeared at the Surrey Theatre in 1823, and his success was so unequivocal that he was soon engaged by the manager of the Adelphi Theatre, where he continued for some

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years as leading low comedian. In 1840 he visited the United States. He afterwards played at the Haymarket, Drury Lane, and Lyceum theatres, of the first of which he was lessee for twenty-three years, retiring from its management a short time before his death, October 31, 1879. Buckstone's acting was not more noted for its comicality and humor, which never degenerated into vulgarity, than for its distinct appreciation of the peculiar traits in each individual character he assumed. Yet his odd personal style and voice were always noticeable, as appeared once with unexpectedly droll effect, when, at the Haymarket Theatre, he sustained the part of the First Witch in *Macbeth*. Buckstone was also a prolific dramatic author, and of about one hundred and fifty pieces he wrote for the stage, several have been highly popular. Among the best known are: *The Green Bushes; The Flowers of the Forest; Luke the Labourer; The Wreck Ashore; The Rough Diamond; Good for Nothing; The Irish Lion; The Alarming Sacrifice; Victorine;* and *Popping the Question*. Consult Marston, *Our Recent Actors* (London, 1890).

BUCKSTONE, Lucy Isabella (1858-93). An English actress, the daughter of John Baldwin Buckstone and sister of John C. Buckstone, also a well-known comedian. At the Haymarket Theatre, London, under her father's management she made her appearance as Ada Ingot in *David Garrick* (1875), after some experience in the provinces. Among her later rôles were those of Annette, in *The Bells*, at the Lyceum; Lucy Ormond, in *Peril*, at the Prince of Wales's Theatre; and Gwendolen Pettigrew, in a successful revival of *The Parvenu*, at the Globe Theatre (1891). She died in London March 17, 1893.

BUCKTAILS. A name for the members of Tammany Hall between about 1817-26. It also came to be applied to the political party which opposed De Witt Clinton during his campaign for reëlection to the Governorship of New York State in 1820.

BUCKTHORN (*Rhamnus*). A genus of shrubs or small trees of the older Rhamnaceæ. They are numerous, and natives of most of the tropical and temperate regions of the world. The common buckthorn (*Rhamnus cathartica*) is a deciduous shrub or low tree, frequent in England and in other parts of Europe and the north of Asia. The leaves are ovate, crenate, and bright green; the branches spiny; the flowers small, yellowish-green and densely clustered; male and female flowers on separate plants; the berries about the size of peas, globular, blue-black, nauseous, and violently purgative. They were formerly much used in medicine, but now more rarely, and only in the form of a sirup prepared from their juice. They supply the sap-green or bladder-green of painters. The bark affords a beautiful yellow dye. The buckthorn is sometimes planted for hedges, but is of too straggling a habit. The alder buckthorn, or berry-bearing alder (*Rhamnus frangula*), is also a native of Great Britain and is frequent in woods and thickets throughout Europe. It is a shrub, rarely a small tree, with spineless branches, oval entire leaves, and small, whitish axillary flowers, which are, in general, somewhat clustered. The charcoal of the wood is light, and is used for the preparation of gunpowder. The bark, leaves, and berries are used for dyeing; the bark for dyeing yellow, and, with preparations of iron, black; the unripe berries to dye wool green and yellow; the ripe berries to dye it bluish-gray, blue, and green. There are about a dozen native species in the United States, one of the most important being *Rhamnus purshiana* of the Pacific States, where it is known as *Cascara sagrada*. It is a tree 15 to 20 feet in height and its bark is extensively used in medicine. It contains tannin, three resins, and other principles, and has a considerable reputation as a tonic, vermifuge, and purgative. *Rhamnus Californica*, an inferior species, is also sometimes called *Cascara sagrada*. Dyer's buckthorn (*Rhamnus infectoria*) is a low shrub, abundant in the south of Europe, whose unripe fruit yields a brilliant yellow dye. The berries and inner bark of *Rhamnus tinctora*, a native of Hungary, are also used in dyeing; as also are the berries of *Rhamnus saxatilis*, a procumbent shrub, growing among rocks as far north as Switzerland. The 'French berries,' 'Avignon berries,' or 'yellow berries' of dyers are the fruit of *Rhamnus infectoria, saxatilis, oleoides*, and *alaternus*. The sea-buckthorn is a shrub of a different genus and order. (See Swallowthorn.) *Bunrelia lanugenosa*, a small tree with hard wood and useful for hedges, is also called buckthorn.

BUCKWHEAT (*buck*, AS. *bōc, bēce*, beech + *wheat*, Ger. *Weizen*, so named in allusion to its triangular seeds, which look like beechnuts). A genus of plants of the natural order Polygonaceæ, or, according to many botanists, a subgenus of Polygonum, distinguished by the central embryo, and by racemes of flowers grouped in panicles. Common buckwheat (*Fagopyrum esculentum* or *Polygonum fagopyrum*) is a native of the basin of the Volga, the shores of the Caspian Sea, and many parts of Central Asia. Its introduction into Europe, the details of which are not definitely known, took place during the Middle Ages. In the Sixteenth Century it spread toward the centre of Europe and has since extended over the entire Continent and the British Isles. The plant is upright, branched, 1 to 3 feet in height; the leaves are triangular, heart-shaped or halberd-shaped; the flowers pale red, the seed (nut) black and triangular, the angles even (not toothed). It is cultivated as a food and forage plant in Europe and America, and very commonly serves as a crop for green manuring. Over eleven million bushels were grown in the United States in 1899. In Germany buckwheat is much valued as a crop, particularly for moorlands and other poor soils. It is of easy cultivation and requires very little nitrogen in the soil, but responds quickly to applications of potash and lime. Thirty bushels or more per acre may be expected, weighing 46 or 48 pounds per bushel. In America the seed is usually sown broadcast over the land, which has been plowed in autumn or early spring and well scarified or harrowed. About a bushel and a half of seed is required when sown broadcast, but a bushel is sufficient if drilled. In the latter case it should not be sown in narrower drills than one foot apart, but two feet is recommended as being better for the succeeding crop, as the wider intervals can be properly cultivated. It should not be sown too early, as the young plants are very sensitive to frost. When the lower seeds are ripe, it should be mown, as they are easily shed out if allowed to stand too long.

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Wet weather during the harvesting season is more injurious to buckwheat than to most other cereals. Tartarian buckwheat (*Fagopyrum* or *Polygonum Tataricum*), a native of Siberia, is distinguished by the toothed edges of the seeds and its more vigorous growth. It is hardy and very productive, but the seeds fall out when ripe more readily than those of the common species, and the flour is darker colored and somewhat bitter. It is well adapted for green manuring. Notch-seeded buckwheat (*Fagopyrum* or *Polygonum emarginatum*) is said to be a native of China. Its seeds are larger than those of common buckwheat, and their angles are winged. When grown in Great Britain, many of its flowers are generally abortive. Perennial buckwheat (*Fagopyrum* or *Polygonum cymosum*) is a native of Nepal, very vigorous in its growth, but producing, at least in Great Britain, comparatively little seed. The triangular black seed of climbing buckwheat or blackbine (*Fagopyrum* or *Polygonum convolvulus*) greatly resembles buckwheat, but is smaller. The plant—a very common weed in gardens and corn-fields in Great Britain—also exhibits much similarity, notwithstanding its different habits and twining stem. For illustration, see Plate of BRAZILNUT.

FOOD VALUE. The grain of buckwheat and its various by-products are used to a limited extent for feeding farm animals, as are also the green plant and the straw. Buckwheat flour and grits are used as human food. The plants are sometimes grown as bee-plants for the honey they furnish, the Japanese buckwheat being especially satisfactory for this purpose. The buckwheat grain has the following percentage composition: Water, 12.6; protein, 10; fat, 2.2; nitrogen, free extract, 64.5; crude fibre, 8.7; and ash, 2. It contains rather more crude fibre and less nitrogen-free extract than other common cereal grains. Buckwheat has been successfully fed to pigs, being not quite equal to wheat for this purpose. It does not appear that, as sometimes claimed, it is a cause of soft pork. It is also used as a poultry food. The hulls are woody and have little feeding value. The portion next to the hull, which is known as middlings, has a high feeding value. A mixture of the hulls and middlings, commonly called buckwheat bran, is much inferior to the middlings on account of the admixture of the comparatively worthless hulls. Buckwheat middlings and bran are usually fed to dairy cows. The floury portion of the grain may be regarded as a valuable and economical feed. Green buckwheat forage is sometimes fed to stock, but often has an injurious effect on sheep. The straw is sometimes fed to sheep. Buckwheat flour is proportionately richer in nutrients than is the whole seed, as the crude fibre is practically all removed in milling. It is used very largely in the United States for making griddle cakes or pancakes, less commonly as a breadstuff and in other ways. Much is used in the manufacture of prepared flour. In Russia buckwheat porridge is a common article of diet. Buckwheat flour is often adulterated with wheat middlings. This grain has been used for brewing and for the manufacture of distilled liquor.

BUCKWHEAT FAMILY. See POLYGONACEÆ.

BUCKWHEAT-TREE. An evergreen shrub, *Cliftonia monophylla*, of the order Cyrillaceæ. It grows around ponds and streams in the Gulf States of North America, and bears fragrant white blossoms. Its name is derived from the shape of its pendulous fruit. The shrub is locally known also by the name of Titi.

BUCOLIC (Gk. βουκολικός, *boukolikos*, rustic, pastoral, from βουκόλος, *boukolos*, cowherd, herdsman). A term derived from the Greek, and equivalent to the term pastoral, of Latin derivation. See PASTORAL POETRY.

BU'CRANE (Gk. βουκράνιον, *boukranion*, ox-head, from βοῦς, *bous*, ox + κρανίον, *kranion*, skull). A decoration consisting of an ox-skull, usually carved on Greek or Roman altars as a traditional ornament, and connected often with festooned wreaths of flowers. This motive passed from altars to friezes and other architectural details. Rams' heads and other animals' heads are often also called bucranes.

BUCY'RUS. A city and county-seat of Crawford County, Ohio, 61 miles north of Columbus, on the Sandusky River, and on the Columbus, Sandusky and Hocking, the Toledo and Ohio Central, and the Pennsylvania railroads (Map: Ohio, E 4). It is in an agricultural and stock-raising region, with numerous mineral springs, and has extensive manufactures of clay-working and general machinery, ventilating and heating apparatus, office and school furniture, fans and blowers, plows, carriages and wagons. The more prominent features of the city are a park, well-paved streets, the county and school buildings, the Sandusky River and bridges, and the water-works and reservoir. Settled in 1818, Bucyrus was incorporated first in 1829. The government is administered under a charter of 1885, which provides for a mayor, elected biennially, and a city council. Population, in 1890, 5974; in 1900, 6560.

BUCZACZ, bōō'chäch. A town of the Austrian Crownland of Galicia, situated on the Strypa, a tributary to the Dniester, about 35 miles east-northeast of Stanislaus (Map: Austria, J 2). It has a handsome Rathaus and the ruins of an old castle. It is famous for its hardy breed of horses. The principal industry is agriculture. In 1672 a treaty of peace was signed here between the Poles and the Turks, by which the former relinquished to the latter considerable territory. Population, in 1890, 11,096; in 1900, 11,504.

BUD (Late ME. *budde*, Dutch *bot*, probably under the influence of OF. *boton*, Fr. *bouton*, bud, button). An undeveloped shoot, in which the older leaves overlap and protect the younger leaves and the growing-point of the axis. They may be considered under two heads, (1) leaf-buds and (2) flower-buds ('alabastra').

LEAF-BUDS. Among seed-plants, leaf-buds are distinguished as either terminal or lateral in position. The terminal bud, if developed, continues the axis, while the lateral bud gives rise to branches. For the most part, the lateral buds hold a definite position in reference to the leaves, the rule being that such a lateral bud is developed in the axil of each leaf. Of course in many cases there are leaves without such buds visible, or even formed in any way. Occasionally there are cases in which more buds than one appear in a single axil, a group of two, three, or more appearing, as in maples, certain willows, etc. These additional buds are spoken of as 'accessory buds.' There are also cases in which

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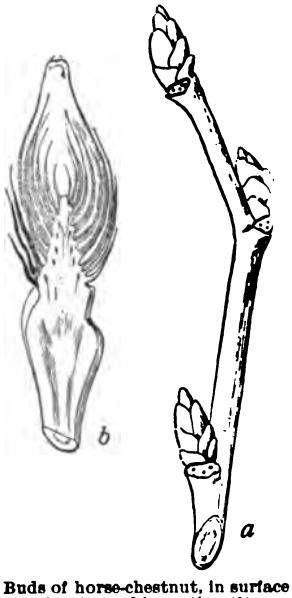
buds appear without any relation to the leaf, and such are known as 'extra-axillary' buds. Again, buds may occur upon the older parts of stems and roots, or even on leaves, arising in this way out of their natural order of succession, and such are said to be 'adventitious.' In some cases buds are formed which do not develop further, and may even be overgrown by the outer layers of the plant-body. Some condition, as a wound, may suddenly afford them opportunity to develop, and they are likely to be mistaken for adventitious buds. Such concealed or hidden buds are known as 'latent' or 'dormant' buds.

The terms just given have to do with the varying positions of buds. There is another set of terms based upon the presence or character of the overlapping leaves. In the 'scaly buds,' which are well known in connection with trees and shrubs of the temperate regions, the old overlapping leaves assume the form of more or less heavy and indurated scales, which serve well to protect the delicate structures within. The protection against moisture and sudden changes in temperature is often still further increased by a coating of some waxy or resinous substance, as in the horse-chestnut and balsam poplar. The scales are often also lined, and the delicate leaves within covered, with downy hairs. As distinct from the scaly buds there are also 'naked buds,' that is, those in which there is no special organization of protecting scales, the ordinary leaves serving the purpose as far as necessary. There are also 'fleshy buds,' in which the investing leaves or scales become gorged with food-substances forming the so-called 'bulbs' (q. v.). Buds or bud-like structures may not merely continue the growth of an axis or give rise to branches, but may also be used in propagation. When they are definitely organized to be separated from the parent plant for this purpose they are known as 'brood-buds.' Brood-buds are very commonly formed by mosses and ferns, as well as by various groups of seed-plants. The arrangement of the leaves in the leaf-bud is called 'vernation,' a fanciful term given by Linnæus to indicate that it is the spring condition of the plant. The term 'præfoliation,' which is a much better one, is sometimes used. Prominent among the terms of vernation are the following: 'Plicate' or 'plaited,' in which the young leaf is folded upon its ribs like a closed fan, as in the maple and currant; 'conduplicate,' in which the leaf is folded lengthwise on its midrib, as in the magnolia; 'convolute,' in which it is rolled from one margin to the other, as in the cherry; 'involute,' in which both margins are rolled toward the middle of the upper face, as in the violet; 'circinate,' in which the leaf is coiled from the apex downward, as in all true ferns.



Buds of horse-chestnut, in surface view (a) and in section (b).

FLOWER-BUDS. In flower-buds the idea of protection is also evident, and the older overlapping leaves of an ordinary bud are represented functionally by the older overlapping sepals. In many cases, however, the sepals furnish no protection, and in some cases the necessary protection is provided by bracts, or leaves entirely outside of the structures of the flower. The arrangement of the members of the flowers in the bud is called 'æstivation,' a term proposed by Linnæus as indicating the summer condition of the plant. A much better term is 'præfloration,' but neither of them is of any special use at present. Certain arrangements of the sepals and the petals in the flower-bud are of considerable value in classification, because they may be constant in plant groups. Prominent among these terms are the following: 'Valvate,' in which the margins meet each other directly without any overlapping, as in the calyx of fuchsia; 'imbricate,' in which the parts overlap one another in the same manner as do the shingles of a roof, a condition well illustrated by the involucres of Compositæ; 'convolute,' in which the sepals or petals appear as if enwrapping one another and then twisted, as in gentians, polemoniums, etc.; 'plicate' or 'plaited,' in which a tubular corolla or calyx is folded into narrow plaits overlapping one another, as in the common jimson-weed.

BUDÆ'US, or **BUDÉ**, bu'dâ', GUILLAUME (1467-1540). A French scholar, one of the greatest of his age. He was born in Paris, and studied there and in Orleans. His works on philology, philosophy, and jurisprudence display extensive learning; the best known are *Annotationes in XXIV. Libros Pandectorum* (1508); *De Asse et Partibus Ejus* (1514), an investigation of ancient coins; and the *Commentarii Linguæ Græcæ* (1519), which greatly advanced the study of Greek literature in France. Budé's abilities were shown not only in literature, but in public business. Louis XII. twice sent him to Rome as ambassador; and Francis I. also employed him in several negotiations. At Budé's suggestion, Francis founded the Collège de France, and was also persuaded to refrain from prohibiting printing, which the Sorbonne had advised in 1533. Budé held several important offices — that of royal librarian, maître des requêts, and provost of Paris. He died August 23, 1540. A collected edition of his works appeared at Basel in 1557. Budé was suspected of a leaning toward Calvinism. Certain circumstances render this highly probable, for in his correspondence with his friend Erasmus he repeatedly expressed his contempt for monks and ignorant ecclesiastics, and on one occasion termed the doctors of the Sorbonne 'prating sophists.' Besides, what is perhaps even more conclusive, shortly after his death his widow and several members of his family moved to Geneva, and openly abjured Catholicism. Consult: E. de Budé, *Vie de Guillaume Budé* (Paris, 1884); *Lettres inédites* (Paris, 1887).

BUDAPEST, bōō'dâ-pĕst, *Hung. pron.* bōō'dŏ-pĕsht (*Buda*, named after Buda, brother of Attila + *Pesth*, from O. Slav. *pešti*, Russ. *pechi*,

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oven, referring to its lime-kiln; *Ofen*, the German name of Buda, across the river, likewise means 'oven'). The capital of the Kingdom of Hungary, the transleithan portion of the Austro-Hungarian Monarchy, situated on both banks of the Danube in latitude 47° 31′ N., and longitude 19° 5′ E., about 173 miles east-southeast of Vienna by rail (Map: Hungary, F 3). It consists of Buda (Ger. Ofen) on the right bank, and Pest on the left bank, connected by five bridges. The Margaret Bridge, opened in 1876, an iron structure in the form of an obtuse angle, crosses the river just below Margaret Island (Ger. *Margarethen Insel;* Hung. *Márgit-Sziget*), to which a connecting bridge has been extended. Below this in order come the Suspension Bridge, erected 1842-49 by English engineers, the Queen Elizabeth Bridge, with one great span, the Franz-Josef Bridge, opened by the Emperor-King in 1896, and the iron railway bridge. Buda, the more ancient and formerly the more important of the two divisions, is picturesquely situated on and around two hills—the lower and more northerly of the two, crowned by a fortress, destroyed by the Hungarians in 1849, but rebuilt for even greater strength; and by the palace erected by Maria Theresa, which has been greatly extended and beautified. The latter contains the Hungarian Regalia and is the scene of the opening of the Hungarian Diet. In the Georgsplatz, which is adorned with a monument of General Hentzi, who fell while defending the fortress in 1849 against the Hungarians, stand the palaces of Archduke Joseph, of the Minister President, and the Ministry of National Defense. A little to the north stands the Parish Church, believed to have been built in the Thirteenth Century, and which served during the Turkish occupation as a mosque. In it Francis Joseph and Elizabeth were crowned in 1867 as King and Queen of Hungary. On a hill at the north end of the town, in the midst of vineyards, is the small Turkish mosque surmounted by a crescent erected over the grave of the Turkish saint, Sheik Gül-Baba. The Blocksberg, standing to the south of the castle hill, is surmounted by a citadel. At the foot of these hills near the river are a number of strong sulphur springs, around which have been erected most commodious and luxurious bathing establishments. The famous bitter-water springs, such as the Hunyadi-János, Árpád, etc., are also situated here.

Pest presents a marked contrast to its neighbor on the opposite side, being built upon a flat, sandy plain, and although of more recent origin, it has far outstripped Buda in growth and general improvements. The old inner town known as the city (*Stadt*; *Belváros*) lies along the bank of the river and has been partially surrounded by an irregular semicircle of boulevards called *Die Innere Ringstrasse*, from which radiate several broad avenues connecting the old town with the new suburbs. The finest of these is the broad Andrássy Strasse (*Andrassy-Tér*) extending in a straight line for a distance of about two miles from the inner ring to the park or *Városligel* (*Stadtwäldchen*). Because of its great breadth, varying from 100 to 140 feet, the excellence of its paving (wood), and the uniform merit of its architectural features, it well deserves the reputation of being one of the handsomest streets in Europe. About a mile out from the inner ring, the radials are crossed by another semicircle of boulevards called *Die Grosse Ringstrasse*, extending from the Margaret Bridge to the Boráros Platz. Still others are planned for the future. One of the most striking features of Pest is the magnificent quays extending along the Danube for a distance of about three miles from the Margaret Bridge to the huge municipal grain-elevator, and lined with many handsome modern buildings. Traffic is excluded from certain sections which contain the fashionable cafés and form a favorite promenade. The most notable of the buildings found here is the magnificent new House of Parliament in the Gothic style, covering an area of nearly four acres and opened with much pomp on the occasion of the Millennial celebration in 1896. Among others may be mentioned the Academy of Sciences (1862-64), containing a library of 180,000 volumes and the National Picture Gallery, the Palace of Prince Coburg, the so-called Redoute Buildings, containing a concert-hall, ball-rooms, etc., and the custom-house. Among the noteworthy public buildings in other parts of the town are the new Palace of Justice, erected in 1896; the court-house of the Royal Supreme Court; the national museum, containing a library of over 200,000 volumes and collections of antiquities, modern paintings, etc.; the university, with a library of over 200,000 volumes; the *Künstlerhaus*, containing the Industrial Museum; the Royal Opera House, one of the handsomest in Europe; the National Theatre; and several of the other numerous theatres.

Among the notable ecclesiastical buildings are the Parish Church, the oldest in Pest, built about 1500, the Greek chapel, and the Jewish synagogue. In the matter of parks and recreation grounds, Budapest has the Stadtwäldchen, a park covering about 1000 acres, with a charming lake, zoölogical garden, and numerous booths and side shows, similar to those found in the Wurstel Prater in Vienna. At the entrance of the park at the end of the Andrássy boulevard is an artesian well over 3000 feet in depth yielding over 260,000 gallons of water daily of a temperature of 165° F. Margaret Island, the property of Archduke Joseph, formerly the seat of a convent founded by Saint Margaret in the Thirteenth Century, has been converted into a park and opened to the public. Budapest is the seat of the highest administrative authorities of the kingdom, of the Supreme Court of Justice, of the Prince Primate of Hungary, of a Roman Catholic vicar-general, a bishop of the Greek-Oriental Church, and of a United States consulate.

For administrative purposes Budapest is divided into ten municipal districts (Bezirke), three of which are on the Buda side and the other seven on the Pest side of the river. The city's affairs are administered by an *Oberbürgermeister* appointed by the King, a *Bürgermeister*, two *Vice-Bürgermeisters*, and an executive board of eight members, chosen for a term of six years by the municipal council of 400 members, who are themselves elected for the same term. Half of this number are chosen by the voters out of 1200 of the largest taxpayers, men of superior education being rated at double the capital on which they actually pay taxes, thus providing special opportunities for the university element to assert itself in the council. As a result of the general efficiency of the municipal authorities, as well as of the desire of the inhabitants to make Budapest one

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of the leading capitals of Europe, the changes and improvements introduced since the granting of the new Hungarian Constitution in 1868 have been highly important. One of the first great problems which confronted the authorities was to provide better sanitary conditions for the city. A huge filtering plant was established for the treatment of the Danube water, which had hitherto been used unfiltered for drinking purposes; and the system of sewers was largely extended and improved, although refuse is still discharged into the river. The overcrowded dwellings of the poor and the damp cellars which sheltered a great part of the working people were found also to contribute largely to the high death-rate. To remedy this, ordinances were passed prohibiting living in cellars, a great many of the crowded quarters were demolished, and in place of the one-story dwellings formerly so numerous, large airy tenements of from three to four stories have been erected.

At the head of Budapest's educational institutions is the university, founded in 1635 at Tyrnau, which was removed to Buda in 1777, and to Pest in 1783, and in 1867 was completely transformed from a German to a Hungarian basis. Next follow the Academy of Sciences, for the fostering of the Maygar language and the sciences; the Royal Polytechnic; the Royal Veterinary College; the Roman Catholic and Reformed seminaries, and the Military Academy (Ludovica). There are some 10 gymnasia, a number of high schools, over 30 upper grammar schools, and more than 160 elementary schools, in which both Hungarian and German are taught. In addition to these there are innumerable mercantile and trade schools of every description, music and art schools, and educational institutions for the blind and for the deaf and dumb. The charitable institutions include a large general municipal hospital, two belonging to the Red Cross Society, two military hospitals, and a number of others run by various charitable organizations, several lunatic asylums, a blind asylum, two orphan asylums, and two poorhouses.

Perhaps the most important branch of industry is the production of flour and bran in the model mills, which have made Budapest one of the greatest milling centres in the world. In connection with this industry the municipality built a huge grain-elevator on the Danube quay, for the purpose of demonstrating the modern methods of handling grain. The manufactures have developed within late years into great prominence and embrace a wide variety of articles. Among the more important are machinery, agricultural implements, carriages, cutlery, glass, majolica, porcelain, metal and leather wares, musical and scientific instruments, starch, cement, liquors, and beer. There are also a large Government firearms factory, three Government tobacco factories and shipbuilding yards. Budapest is not only the largest industrial centre of Hungary, but contains the greater part of its modern large industrial establishments. The number of stock companies doing business in the city increased from 42 in 1889 to 149 in 1898, and their capital from $18,000,000 in the former year to $65,000,000 in the latter. The trade is of perhaps greater importance than the manufactures, the chief articles of commerce being grain, wine, alcohol, tobacco, hemp, honey, wax, hides, feathers, and cattle, sheep, and swine. In 1880 the imports amounted in metric tons to 1,566,238, the exports 806,419; in 1890, 2,420,027 and 1,322,718, and in 1898, 4,606,584 and 1,860,824 respectively. The commercial importance of Budapest is materially increased by the fact that it is the central point of all the Hungarian railways, and in consequence the greater part of the agricultural produce is exported by way of the capital. The Danube also plays a prominent part in its commercial activity, as most of the grain is brought from the interior in huge barges, often having a capacity of over 600 tons, by way of this great waterway and its tributaries. As regards its street railway facilities, Budapest compares favorably with any of the great capitals. It bears the distinction of being the first city successfully to demonstrate the entire practicability of the electric underground trolley system. The first line was opened in 1889, and has proved entirely satisfactory, both from a mechanical and financial standpoint. An electric underground road opened in 1896 extends from the Giselaplatz near the river to the Stadtwäldchen; innumerable overhead trolley lines and steam tramways connect the capital with its suburbs and neighboring towns, while the various hills on the Buda side of the river are ascended by cable or cog roads. Most of these lines were built and operated by private companies, but at the expiration of their charters are to become the property of the city. The growth of population is shown by the following figures: in 1780 it was 35,215; in 1810, 60,259; in 1841, 107,240; in 1880, 360,551; in 1890, 492,237; in 1900, 713,383, or an increase of more than 45 per cent. in the last decade of the century.

HISTORY. It is known that in the Second Century Buda was the site of a Roman camp, Aquincum. Pest is first heard of in the Thirteenth Century, when it appears as a populous town inhabited mainly by Germans. In 1444 Matthias Corvinus fortified Buda and made it the capital of the country, but the citadel fell into the hands of the Turks after the battle of Mohács in 1526, and from 1541 remained continuously in their possession till 1686. During this period of 160 years it stood six sieges, while the town of Pest was almost completely destroyed. Reoccupied by the Hapsburgs in 1686, Buda became a free Imperial city and prospered wonderfully in spite of a disastrous inundation which wiped out a large part of the town in 1838. On May 21, 1848, after a heroic defense by Hentzi, the citadel of Buda was stormed by the Hungarians under Görgei, and Pest was for a brief time the capital of the revolutionary government. After the *Ausgleich* of 1867 Pest became the capital of the Hungarian Kingdom. In 1873 Buda and Pest were united as Budapest.

BIBLIOGRAPHY. Szalay and Kahn, *Die Ungarische Metropole* (Budapest, 1889); Hevest, *Budapest und Seine Umgebungen* (Budapest, 1873); "Budapest und Fiume," in *Oesterreich-Ungarische Monarchie in Wort und Bild*, Vol. III. (Vienna, 1893); Gelléri, *Ungarns Millennium* (1896); Körösy, *Statistisches Jahrbuch der Haupt- und Residenz-Stadt Budapest* (Budapest, 1891); Shaw, *Municipal Government in Continental Europe* (New York, 1897); Lewis, "Antiquities at Buda-Pest," in *Archæological Journal*, Vol. L. (London, 1893).

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BUDAPEST, University of. The Royal Hungarian university, which has followed the varied fortunes of its native land. A university was established at Budapest in 1389-90 by King Sigismund on an older foundation. This disappeared in the next century, and another was founded at the end of the Fifteenth Century by King Matthias, which was in turn destroyed by the Turkish invasions of the Sixteenth Century. In the first half of the Seventeenth Century a national university was founded by Archbishop Cardinal Peter of Pázmány at Tyrnau, partly under Jesuit control. At the fall of the Jesuits, this obtained some of their property. In 1769-70 Maria Theresa finally established the national university on a firm basis. In 1777 it was removed to Buda, and in 1783 to Pest, where in 1786 a building was given it by Joseph II. It was reorganized in 1850 on the Austrian model, but since that time has come entirely under Hungarian influences. It had in 1902 over 5000 students. Its faculties include theology, law and politics, medicine and philosophy, arts and science. Its library was founded in 1635 and contains over 225,000 volumes and 2048 manuscripts.

BUDAUN, bōō'dä-ōōn'. A town of India, 140 miles northwest of Lucknow, giving its name to a British district of the Rohilkund division of the Northwest Provinces (Map: India, C 3). It is situated in latitude 28° 27′ N. and longitude 79° 11′ E. Population, 35,000.

BUDD, Joseph Lancaster (1835—). An American horticulturist, born at Peekskill, N. Y. In 1901 he occupied the chair of horticulture and forestry in the Iowa Agricultural College. He introduced many specimens of fruits and ornamental trees indigenous to Russia into the United States, and in this way has contributed greatly to the arboriculture and horticulture of the Northwest.

BUDDE, bōōd'de, Karl Ferdinand Reinhard (1850—). A German theologian; born at Bensberg, near Cologne. He was inspector of the Evangelisches Theologisches Stift at Bonn from 1878 to 1885, professor extraordinary at Bonn University from 1879 to 1889, and became, successively, professor ordinary at Zurich and Strassburg. His publications include: *Die Bücher Richter und Samuel, ihr Aufbau und ihre Quellen* (1890); "The Religion of Israel to the Exile," in *American Lectures on the History of Religions* (1899); and numerous commentaries and translations.

BUDDHISM, bōōd'iz'm. The religion known as Buddhism, from the title of 'The Buddha' (meaning in Sanskrit the wise, the enlightened), acquired by its founder, has existed now for nearly twenty-five centuries, and is, next to Christianity, the most extended religion of the world; but in this estimate all the Chinese and Japanese are classed as Buddhists. In Hindustan, the land of its birth, it has now little hold, except among some of the northern tribes; but it bears full sway in Ceylon, Nepal, and over the whole Indo-Chinese Peninsula. It shares the adherence of the Chinese with the systems of Confucius and Lao-tse, claiming perhaps two-thirds of the population. It prevails also in Japan, although not the established religion; and north of the Himalayas it is the religion of Tibet (where it assumes the form of Lamaism), and of the Mongolian population of Central Asia, and extends to the very north of Siberia, and even into Lapland. Its adherents are estimated at from 100,000,000 to 400,000,000. Yet, until near the middle of the Nineteenth Century, nothing was known in Europe respecting the nature and origin of this world religion, beyond the vaguest notices and conjectures. About the year 1828 Mr. B. H. Hodgson, British Resident at the Court of Nepal, where Buddhism prevails, discovered the existence of a large set of writings in Sanskrit language, forming the national canonical books. These books have since been found to be texts from which the Buddhist scriptures of Tibet, Mongolia, and China must have been translated. The books of the Ceylon Buddhists are in the language called Pāli. They are not translations of the Nepalese standards, though they are found to agree with them in some particulars. Most scholars now think that the Pāli canon is older and more authoritaitve than the Sanskrit (Northern) canon. Translations from the Ceylon standards are used by the Buddhists of Burma and Siam. Copies of the Sanskrit books of Nepal were sent by Mr. Hodgson to the Asiatic societies of London and Paris, and they engaged the attention of the eminent Oriental scholar Eugène Burnouf (q.v.), who published in 1844 his *Introduction to the History of Buddhism;* and this book may be said to have been the beginning of correct information on the subject among the Western nations.

The most diverse opinions had previously prevailed as to the time and place of the origin of Buddhism. Some looked upon it as a relic of what had been the original religion of Hindustan, before Brahmanism intruded and drove it out; a relic of a widespread primeval worship, whose ramifications it was endeavored to trace by identifying Buddha with the Woden of the Scandinavians, with the Thoth or Hermes of the ancient Egyptians, and with other mythological personages. Others held that it could not be older than Christianity, and must have originated in a blundering attempt to copy that religion, so striking are the many points of resemblance that present themselves. Although the means are still wanting of giving a circumstantial history of Buddhism, the main outline is no longer doubtful. Most Oriental scholars now fix the date of its origin about the middle of the Sixth Century B.C., and all agree that it arose in the north of Hindustan. According to the Buddhist books, the founder of the religion was a prince of the name of Siddhartha, son of Suddhodana, the petty rāja of Kapilavastu, on the southern border of the District of Nepal. He is often called Sakya, which was the name of the family, and also Gautama. The name Sakya often becomes Sakya-muni (*muni,* in Sanskrit, means 'solitary'), in allusion to the solitary habits assumed by the prince. To Gautama is frequently prefixed *Sramana,* meaning *ascetic.* Of the names, or rather titles, given to Siddhartha in his state of perfection, the most important is the *Buddha,** which is from the root

* There is a confusing variety in the modes in which this name is spelled by European writers. S. Hardy, in his *Manual of Buddhism,* gives more than fifty forms that have come under his notice. Some of the more common are Bud, Bod, Buth, Budh, Boodh, Bhood, Budo, Buddow, Boutta, Poota, Poth, Pot. The Chinese, owing to the meagreness of their articulations, seem to have been unable to come nearer to the real sound than Fo, Foe, or Fohi; from the same cause, they convert Brahma into Fan.

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budh, to know, and means 'enlightened' or 'he to whom truth is known'; it is indicative of the leading doctrine of his system. Other attributes are 'the blessed' (Bhagavat); 'the venerable of the world'; 'the Bodhisat,' the import of which will be afterwards explained. The history of this person is overlaid with a mass of extravagant and incredible legend, and the eminent Orientalist Senart thought it doubtful whether the legendary Buddha was an actual historical personage and not rather an allegorical figment. But by Oriental authorities generally the Buddha is received as the actual personal founder of the religion that goes by his name.

Assuming that the Buddha was a real person, and that there is a basis of fact under the mass of extravagant fable with which he is surrounded, the history of Buddhism may be thus briefly outlined: The prince Siddhartha gives early indications of a contemplative, ascetic disposition; and his father, fearing lest he should desert his high station as Kshatriya (see INDIA and CASTE) and ruler, and take to a religious life, has him early married to a charming princess and surrounded with all the splendor and dissipation of a luxurious court. Twelve years spent in this environment only deepen the conviction that all that life can offer is vanity and vexation of spirit. He is constantly brooding over the thought that old age, withered and joyless, is fast approaching; that loathsome or racking sickness may at any moment seize him; that death will at all events soon cut off all present sources of enjoyment and usher in a new cycle of unknown trials and sufferings. These images hang like Damocles's sword over every proposed feast of pleasure, and make enjoyment impossible. He therefore resolves to try whether a life of austerity will not lead to peace; and, although his father seeks to detain him by setting guards on every outlet of the palace, he escapes, and begins the life of a religious mendicant, being now 29 years old. To mark his breaking off all secular ties, he cuts off the long locks that were a sign of his high caste; and as the shortened hair turned upward, he is always represented in figures with curly hair, which induced early European writers to consider him as of Ethiopian origin. He commences by studying all that the Brahmans can teach him, but he finds their doctrine unsatisfactory. Six years of rigorous asceticism are equally vain; and resolving to return to a more genial life, he is deserted by five disciples, who had been attracted to him. At this time he triumphantly withstands the temptation by the demon Māra. But no discouragement or opposition can divert Sakya-muni from the search after deliverance. He will conquer the secret by sheer force of thinking. He sits for weeks plunged in abstraction, revolving the causes of things. If we were not born, he reflects, we should not be subject to old age, misery, and death; therefore the cause of these evils is birth. But whence comes birth or continued existence? Through a long concatenation of intermediate causes he arrives at the conclusion that ignorance is the ultimate cause of existence; and therefore with the removal of ignorance, rebirth, and all its consequent anxieties and miseries, would be cut off at their source. Passing through successive stages of contemplation, he realizes this in his own person, and attains the perfect wisdom of the Buddha. The scene of this final triumph received the name of Bodhimanda ('the seat of intelligence'), and the tree under which he sat was called Bodhidruma ('the tree of intelligence'), whence bo-tree. The Buddhists believe the spot to be the centre of the earth. Twelve hundred years after the Buddha's death, Hiouen-Thsang, the Chinese pilgrim, found the Bodhidruma—or a tree that passed for it—still standing. There are, about 5 miles from Gaya (near Patna), extensive ruins and a temple, which are believed to mark the place. Behind the temple there flourished, in 1812, a peepul-tree, apparently 100 years old, which may have been planted in the place of the original bo-tree. A young tree now stands in its place. The temple is restored and a Buddhist monastery has been built near by, and it remains as the only home of the faith in India proper.

Having arrived at the knowledge of the causes of misery, and of the means by which these causes are to be counteracted, the Buddha was now ready to lead others on the road to salvation. It was at Benares that he first preached, or, in the consecrated phrase, 'turned the wheel of the law'*; but the most important of his early converts was Bimbisara, the sovereign of Magadha (Behar), whose dynasty continued for many centuries to patronize the new faith. During the forty-four years that he continued to preach his gospel he appears to have traversed a great part of northern India combating the Brahmans and everywhere making numerous converts. He died at Kusinagara (in Oude) at the age of eighty, probably in the year B.C. 477; and his body being burned, the relics were distributed among a number of contending claimants, and monumental tumuli were erected to preserve them. See TOPES.

The most important point in the history of Buddhism, after the death of its founder, is that of the three councils, which are said to have fixed the canon of the sacred scriptures and the discipline of the Church. The Buddha had composed no work himself, but his chief followers assembled in council immediately after his death and proceeded to reduce his teaching to a canon. These canonical works are divided into three classes, forming the Tripitaka, or 'triple basket.' The first class consists of the *vinaya*, or discipline; the second contains the *sūtras*, or discourses; and the third the *abhidharma*, or psychology. The other two councils are said to have further settled the canon and revised the belief of the Church. It is, however, exceedingly doubtful whether the first council had such a character as tradition assigns to it, and the very existence of the second council is doubted by competent scholars. The second council is said to have been held one hundred years after Buddha's death; the third in B.C. 246. Still another was held between A.D. 76 and 100. At precisely what date the Pāli canon as we have it was fixed is still uncertain, but probably it was in the main what it is now as early as the Third

* From a too literal understanding of a metaphor have arisen, probably, those praying-wheels, or rather wheels for meditation, seen standing before Buddhist monasteries in Tibet and elsewhere. The doctrines of Buddha are inscribed on the wheel, which is then set in motion by a windlass, or even by horse-power. The individual monks have portable ones, with which they perform their devotions wherever they may happen to be.

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Century B.C. The canon was not reduced to writing till the First Century B.C. Besides the Tripitaka referred to above, the canon of the Great Vehicle (*Mahāyāna*) contains two special works, dating not certainly earlier than the times of Kanishka, and of the First Century A.D. These are 'The Lotus of the Good Law,' and the *Lalita Vistara*, the latter of which contains the life of Buddha. To these may be added the Mahāvastu, which belongs to the Second Century B.C. All the northern Buddhists recognize these books as authoritative. The *Buddhacarita*, the earliest life of Buddha, dates from the First Century A.D. (See ASVAGHOSHA). The Buddhist religion early manifested a zealous missionary spirit, and princes and even princesses became devoted propagandists. A prince of the royal house of Magadha, Mahindo, carried the faith to Ceylon, B.C. 307. The Chinese annals speak of a Buddhist missionary as early as B.C. 217; and the doctrine made such progress that in A.D. 65 it was acknowledged by the Chinese Emperor as a third State religion. The Chinese Buddhists have always looked on India as their 'holy land,' and, beginning with the Fourth Century of our era, a stream of Buddhist pilgrims continued to flow from China to India during six centuries. Several of these pilgrims have left accounts of their travels, which throw a light on the course of Buddhism in India, and on the internal state of the country in general, that is looked for in vain in the literature of India itself. See HIOUEN-THSANG.

A prominent name in the history of Buddhism is that of Asoka, King of Magadha in the Third Century of our era, whose sway seems to have extended over the whole peninsula of Hindustan, and even over Ceylon. (See ASOKA.) This prince was to Buddhism what Constantine was to Christianity. He was at first a persecutor of the faith, but being converted—by a miracle, according to the legend—he became a zealous propagator of the religion—not, however, as princes usually promote their creed, for it is a distinguishing characteristic of Buddhism that it has never employed force, rarely even to resist aggression. Asoka showed his zeal by building and endowing vihāras or monasteries and raising topes and other monuments over the relics of Buddha, and in spots remarkable as the scenes of his labors. Hiouen-Thsang, in the Seventh Century of our era, found topes attributed to Asoka from the foot of the Hindu Kush to the extremity of the peninsula. There exist, also, in different parts of India, edicts inscribed on rocks and pillars inculcating the doctrines of Buddha. The edicts are in the name of King Piyadasi.

Not a single building or sculptured stone has been discovered in continental India of earlier date than the reign of this monarch. A remarkable spirit of charity and toleration runs through these royal sermons. The 'king beloved of the gods' desires to see the ascetics of all creeds living in all places, for they all teach the essential rules of conduct. "A man ought to honor his own faith only; but he should never abuse the faith of others. . . . There are even circumstances where the religion of others ought to be honored, and in acting thus a man fortifies his own faith and assists the faith of others."

For the glimpses we get of the state of Buddhism in India we are indebted chiefly to the accounts of Chinese pilgrims. Fa-hian, at the end of the Fourth Century, found some appearances of decline in the east of Hindustan, its birthplace, but it was still strong in the Punjab and the north. In Ceylon it was flourishing in full vigor, the ascetics or monks numbering from 50,000 to 60,000. In the Seventh Century—that is, 1200 years after the death of the Buddha—Hiouen-Thsang represents it as dominant but decaying, though patronized by powerful rājas.

During the first four or five centuries of our era, and in some instances much earlier, Buddhists, perhaps driven from the great cities, retired among the hills of the west, and there constructed those cave-temples which, for their number, vastness, and elaborate structure, continue to excite the wonder of all who see them. There are reckoned to be not fewer than 900 Buddhist excavations still extant in India, nearly all within the Presidency of Bombay. How the destruction of the Buddhist faith in Hindustan came about—whether from internal corruption, or the persecution of powerful princes, adherents of the old faith—we are utterly in the dark. But it is certain that from the time of Hiouen-Thsang's visit its decay must have been rapid beyond precedent, for about the Eleventh or Twelfth Century the last traces of it disappear from the Indian peninsula.

What, then, is the nature of this faith, which has been for so long, and is still, the sole light of so many millions of human beings? In answering this question we must confine ourselves here to a brief outline of the intellectual theory on which the system is based, and of the general character of its morality and ritual observances, as they were conceived by the founder and his more immediate followers; referring for the various forms which the external observances have assumed to the several countries where it is believed and practiced. See BURMA; CEYLON; CHINA; JAPAN; LAMAISM.

Buddhism accepts without questioning the doctrine of transmigration, which lies at the root of so much that is strange in the Eastern character. For a particular account of this important doctrine or notion, which seems ingrained in the constitution of Eastern minds, and without a knowledge of which no phase of thought or feeling among them can be understood, the reader is referred to TRANSMIGRATION; while the peculiar cosmogony or system of the universe with which it is associated, and which is substantially the same among Hindus and Buddhists, will be described under INDIA. It is sufficient here to say that, according to Buddhist belief, when a man dies he is immediately born again, or appears in a new shape; and that shape may, according to his merit or demerit, be any of the innumerable orders of being that compose the Buddhist universe—from a clod to a divinity. If his demerit would not be sufficiently punished by a degraded earthly existence—in the form, for instance, of a woman or a slave, of a persecuted or a disgusting animal—he will be born in some one of the 136 Buddhist hells, situated in the interior of the earth. These places of punishment have a regular gradation in the intensity of the suffering and in the length of time the sufferers live, the least term of life being 10,000,000 of years, the longer terms being al-

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most beyond the powers of even Indian notation to express. A meritorious life, on the other hand, secures the next birth either in an exalted and happy position on earth, or as a blessed spirit, or even divinity, in one of the many heavens, in which the least duration of life is about ten billions of years. But however long the life, whether of misery or of bliss, it has an end, and at its close the individual must be born again, and may again be either happy or miserable—either a god or, it may be, the vilest inanimate object.* The Buddha himself, before his last birth as Sakyamuni, had gone through every conceivable form of existence on the earth, in the air, and in the water, in hell and in heaven, and had filled every condition in human life. When he attained the perfect knowledge of the Buddha he was able to recall all these existences; and a great part of the Buddhist legendary literature is taken up in narrating his exploits when he lived as an elephant, as a bird, as a stag, and so forth.

The Buddhist conception of the way in which the quality of actions—which is expressed in Sanskrit by the word *karma*, including both merit and demerit—determines the future condition of all sentient beings, is peculiar. They do not conceive any god or gods as being pleased or displeased by the actions, and as assigning the actors their future condition by way of punishment or of reward. The very idea of a god, as creating or in any way ruling the world, is utterly absent in the Buddhist system. God is not so much as denied; he is simply not known. Contrary to the opinion once confidently and generally held, that a nation of atheists never existed, it is no longer to be disputed that the numerous Buddhist nations are essentially atheist; for they know no beings with greater supernatural power than any man is supposed capable of attaining to by virtue, austerity, and science. The future condition of the Buddhist, then, is not assigned him by the Ruler of the Universe; the 'karma' of his actions determines it by a sort of virtue inherent in the nature of things—by the blind and unconscious concatenation of cause and effect. But the laws by which consequences are regulated seem dark, and even capricious. A bad action may lie dormant, as it were, for many existences; the taint, however, is there, and it will some time or other break out. A Buddhist is thus never at a loss to account for any calamity that may befall himself or others.

Another basis of Buddhism is the assumption that human existence is on the whole miserable, and a curse rather than a blessing. An enervating climate and political conditions may have aided in producing the feeling common to Brahman and Buddhist that life is evil. But the root of the matter is philosophical. Life is a whole; nature is a whole; to be born is to become separate or individualized from the whole. Individuality implies limitation; limitation implies error; error implies ignorance. Hence birth is an evil because it is inseparable from ignorance, and it is only the removal of ignorance which can lead to the suppression of desire, while only the suppression of desire can lead to peace. The little value that Hindus set upon their lives is manifested in many ways. The punishment of death, again, has little or no terror for them, and is even sometimes coveted as an honor.

In the eyes, then, of Sakyamuni and his followers, sentient existence was hopelessly miserable. Misery was not a mere taint in it, the removal of which would make it happy—misery was its very essence. Death was no escape from this inevitable lot, for, according to the doctrine of transmigration, death was only a passage into some other form of existence equally doomed. Even the heaven and the state of godhead, which form part of the cycle of changes in this system, were not final; and this thought poisoned what happiness they might be capable of yielding. Brahman philosophers had sought escape from this endless cycle of unsatisfying changes by making the individual soul be absorbed in the universal spirit (Brahman): Gautama had the same object in view—viz., exemption from being born again; but he had not the same means of reaching it. He recognized no soul, and his philosophy was utterly atheistic. Gautama sees no escape but in what he calls Nirvāna, literally 'extinction,' 'blowing out,' of desire; but most Orientalists are agreed that in the Buddhist scriptures generally it is equivalent to annihilation. Even in those schools which attempt to draw a distinction, the distinction is of the most evanescent kind. See NIRVANA.

The key of the whole scheme of Buddhist salvation lies in what Gautama called his four sublime verities. The first asserts that pain exists; the second, that the cause of pain is desire or attachment—the meaning of which will appear further on; the third, that pain can be ended by suppressing desire; and the fourth shows the way that leads to this. This way consists in eight things: Right faith, right judgment, right language, right purpose, right practice, right effort, right thinking, and right meditation. In order to understand how this method is to lead to the proposed end, we must turn to the metaphysical part of the system contained in the 'concatenation of causes,' or 'chain of causation,' which may be looked upon as a development of the second 'verity'—namely, that the cause of pain is desire—or rather, as the analysis upon which that verity is founded. The immediate cause of pain is birth, for if we were not born we should not be exposed to death or any of the ills of life. Birth, again, is caused by previous existence; it is only a transition from one state of existence into another. All the actions and affections of a being throughout his migrations leave their impressions, stains, attachments adhering to him, and the accumulation of these determines at each stage the peculiar modification of existence he must next assume. This is the only soul that Buddha recognizes. These adhesions or attachments, good and bad, depend upon desire. We thus arrive at desire—including both the desire to possess and the desire to avoid—as one link in the chain of causes of continued existence and pain. Beyond this the dependence of the links is very difficult to trace;

* According to one legend the Bhagavat, in order to impress upon the monks of a monastery the importance of their duties, pointed to a besom, and, by his supernatural insight, he revealed to them that it had once been a novice, who had been negligent in sweeping the hall of assembly. The walls and pillars, again, he told them, had once existed as monks, who soiled the walls of the hall by spitting upon them.

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for desire is said to be caused by perception, perception by contact, and so on, until we come to ideas. Ideas, however, are mere illusions, the results of ignorance or error, attributing durability and reality to that which is transitory and imaginary. Cut off this ignorance, bring the mind into a state in which it can see and feel the illusory nature of things, and forthwith the whole train vanishes; illusory ideas, distinction of forms, senses, contact, perception, desire, attachment, existence, birth, misery, old age, death!

Morality and Religious Observances.—The eight parts or particulars constituting the theoretical 'way' (to Nirvāna), were developed by Gautama into a set of practical precepts enjoining the various duties of common life and of religion. They are all ostensibly intended as means of counteracting or destroying the chain of causes that tie men to existence and necessitate being born again, especially that most important link in the chain constituted by the attachments or desires resulting from former actions; although the special fitness of some of the precepts for that end is far from being apparent. In delivering his precepts, the Buddha considers men as divided into two classes—those who have embraced the religious life (*Sramanas*), and those who continue in the world, or are laymen. These last are considered as too much attached to existence to feel any desire or have any hope of emancipation—at least at this stage. But there are certain precepts which it is necessary for all to obey that they may not bring greater misery upon themselves in their next births, and rivet the bonds of existence more indissolubly. There are ten moral precepts or 'precepts of aversion.' Five of these are of universal obligation—viz., not to kill; not to steal; not to commit adultery; not to lie; not to be drunken. Other five are for those entering on the direct pursuit of Nirvāna by embracing the religious life; to abstain from food out of season—that is, after midday; to abstain from dances, theatrical representations, songs, and music; to abstain from personal ornaments and perfumes; to abstain from a lofty and luxurious couch; to abstain from taking gold and silver. For the regular ascetics, or monks, there are a number of special observances of a very severe kind. They are to dress only in rags, sewed together with their own hands, and to have a yellow cloak thrown over their rags. They are to eat only the simplest food, and to possess nothing except what they get by collecting alms from door to door in their wooden bowls. They are allowed only one meal, and that must be eaten before midday. For a part of the year they are to live in forests, with no other shelter except the shadow of a tree, and there they must sit on their carpet even during sleep, to lie down being forbidden. They are allowed to enter the nearest village or town to beg food, but they must return to their forests before night.

Besides the absolutely necessary 'aversions and observances' above mentioned, the transgression of which must lead to misery in the next existence, there are certain virtues or 'perfections' of a supererogatory or transcendent kind that tend directly to 'conduct to the other shore' (Nirvāna). The most essential of these are almsgiving or charity, purity, patience, courage, contemplation, and knowledge. Charity or benevolence may be said to be the characteristic virtue of Buddhism—a charity boundless in its self-abnegation, and extending to every sentient being. The benevolent actions done by the Buddha himself, in the course of his many millions of migrations, were favorite themes of his followers. On one occasion, seeing a tigress starved and unable to feed her cubs, he hesitated not to make his body an oblation to charity, and allowed them to devour him. Benevolence to animals, with that tendency to exaggerate a right principle so characteristic of the East, is carried among the Buddhist monks to the length of avoiding the destruction of fleas and the most noxious vermin, which they remove from their persons with all tenderness. The sect of the Jains (q.v.) carried this to absurd extremes.

There are other virtues of a secondary kind, though still highly commendable. Thus, not content with forbidding lying, the Buddha strictly enjoins the avoidance of all offensive and gross language, and of saying or repeating anything that can set others at enmity among themselves; it is a duty, on the contrary, especially for a Sramana, to act on all occasions as a peacemaker. Patience under injury and resignation in misfortune are strongly inculcated. Humility, again, holds a no less prominent place among Buddhist graces than it does among the Christian. The Buddhist saints are to conceal their good works and display their faults. As the outward expression of this sentiment of humility, Gautama instituted the practice of confession. Twice a month, at the new and at the full moon, the monks confessed their faults aloud before the assembly. This humiliation and repentance seems the only means of expiating sin that was known to Gautama. Confession was exacted of all believers, only not so frequently as of the monks. The edicts of Piyadasi recommend a general and public confession at least once in five years. The practice of public confession would seem to have died out by the time of Hiouen-Thsang's visit to India.

Such are the leading features of the moral code of the Buddha, of which it has been said that "for pureness, excellence, and wisdom, it is only second to that of the Divine Lawgiver himself." But the original morality of Buddhism has, in the course of time, been disfigured by many subtleties, puerilities, and extravagances, derived from the casuistry of the various schools of later times. The theory on which the Buddha founds his whole system gives, it must be confessed, only too much scope to such perversions; for, on that theory, truth is to be spoken, self to be sacrificed, benevolence to be exercised, not for the sake of the good thus done to others, but solely for the effect of this conduct on the individual himself, in preparing him for escape from existence. To teach men 'the means of arriving at the other shore' was another expression for teaching virtue; and that other shore was annihilation. On this principle the Buddhist casuist can, like the Jewish, render of no effect the universal law of charity and the duty of respecting and aiding parents, on which the Buddha laid such stress. Thus, a Bhikshu, or Bhikku—that is, one who has engaged to lead a life of self-denial, celibacy, and mendicancy, and is thus on the high road to Nirvāna—is

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forbidden to look at or converse with a female, lest any disturbing emotion should ruffle the serene indifference of his soul; and so important is this that "if his mother have fallen into a river, and be drowning, he shall not give her his hand to help her out; if there be a pole at hand he may reach that to her; but if not, she must drown."—*Wilson*.

Contemplation and science or knowledge (i.e. of the concatenation of causes and effects) are ranked as virtues in Buddhism, and hold a prominent place among the means of attaining Nirvāna. It is reserved, in fact, for abstract contemplation to effect the final steps of the deliverance. Thought is the highest faculty of man, and, in the mind of an Eastern philosopher, the mightiest of all forces. A king who had become a convert to Buddhism is represented as seating himself with his legs crossed, and his mind collected; and 'cleaving with the thunder-bolt of science the mountain of ignorance,' he saw before him the desired state. It is in this cross-legged, contemplative position that the Buddha is almost always represented—that crowning intellectual act of his, when, seated under the bo-tree (q.v.), he attained the full knowledge of the Buddha, saw the illusory nature of all things, broke the last bonds that tied him to existence, and stood delivered for evermore from the necessity of being born again, being considered the culmination of his character and the highest object of imitation to all his followers.

'Complete' Nirvāna or extinction of desires, which, in the original meaning of the term, is attainable during life, was, in fact, attained by Gautama himself. The process by which the state is attained is called *Dhyāna*, and is neither more nor less than ecstasy or trance, which plays so important a part among mystics of all religions. The individual is described as losing one feeling after another, until perfect apathy is attained, and he reaches a state 'where there are neither ideas, nor the idea of the absence of ideas!'

The *ritual* or *worship* of early Buddhism—if worship it can be called—is very simple in its character. There are no priests, or clergy, properly so called. The *Sramanas* or *Bhikshus* (mendicants) are simply a religious order—a kind of monks, who, in order to the more speedy attainment of Nirvāna, have entered on a course of greater sanctity and austerity than ordinary men; they have no sacraments to administer nor rites to perform for the people, for every Buddhist is his own priest. The only thing like a clerical function they discharge is to read the scriptures or discourses of the Buddha in stated assemblies of the people held for that purpose. But in northern Buddhism there is a complete ritual, with rites and worship strangely like that of the Roman Catholic Church, through whose missionaries these traits may have been introduced. In some countries the monks are exceedingly numerous; around Lhassa in Tibet, for instance, they are said to be one-third of the population. They live in *vihāras* or monasteries, and subsist partly by endowments, but mostly by charity. Except in Tibet, they are not allowed to engage in any secular occupation. The vow is not irrevocable. This incubus of monasticism constitutes the great weakness of Buddhism in its social aspect. Further particulars regarding Buddhist monks and monasteries, as well as the forms of Buddhist worship generally, will be given when speaking of the countries where the religion prevails. See LAMAISM.

The adoration of the statues of the Buddha and of his relics is the chief external ceremony of the religion. This, with prayer and the repetition of sacred formulas, constitutes the ritual. The centres of the worship are the temples containing statues, and the topes or tumuli erected over the relics of the Buddha, or of his distinguished apostles, or they are located at spots which have become sacred as the scenes of the Buddha's acts. The central object in a Buddhist temple, corresponding to the altar in a Roman Catholic church, is an image of the Buddha, or a dagoba or shrine containing his relics. Here flowers,* fruit, and incense are daily offered, and processions are made with singing of hymns. Of the relics of the Buddha, the most famous are the *teeth* that are preserved with intense veneration in various places. Hiouen-Thsang saw more than a dozen of them in different parts of India; and the great monarch Silāditya was on the point of making war on the King of Cashmere for the possession of one, which, although by no means the largest, was yet an inch and a half long. The tooth of the Buddha preserved in Ceylon, a piece of ivory about the size of the little finger, is exhibited very rarely, and then only with permission of the English Government—so great is the concourse and so intense the excitement. See CEYLON.

There appears at first sight to be an inconsistency between this seeming worship of the Buddha and the theory by which he is considered as no longer existing. Yet the two things are really not irreconcilable—not more so, at least, than theory and practice often are. With all their admiration of the Buddha, his followers have never made a god of him. Gautama is only the last Buddha—the Buddha of the present cycle. He had predecessors in the cycles that are past (twenty-four Buddhas of the past are enumerated, and Gautama could even tell their names); and when, at the end of the present cycle, all things shall be reduced to their elements, and the knowledge of the way of salvation shall perish with all things else, then, in the new world that shall spring up, another Buddha will appear, again to reveal to the renascent beings the way to Nirvāna. Gautama foretold that Maitreya, one of his earliest adherents, should be the next Buddha† (the Buddha of the future), and he gratified several of his followers with a like prospect in after-cycles. The Buddha was thus no greater than any mortal may aspire to become. The prodigious and

* The quantity of flowers used as offerings is prodigious. A royal devotee in Ceylon, in the Fifteenth Century, offered on one occasion 6,480,320 flowers at the shrine of the tooth. At one temple it was provided that there should be offered "every day 100,000 flowers, and each day a different flower."

† One who is on the way to become a supreme Buddha, and has arrived at that stage when he has only one more birth to undergo, is styled a *Bodhisat* (having the essence of knowledge); a mere candidate for Nirvāna is an *arhat* (venerable). The Northern Buddhists aim at becoming *Bodhisats*, or future saviors, and this marks them off from the older (selfish) ideal of becoming an *arhat*. The former is called the religion of the Great Vehicle, the latter that of the Little Vehicle (mahāyāna and hinayana).

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supernatural powers which the legends represent him as possessing are quite in accordance with Indian ideas; for even the Brahmans believe that by virtue, austerities, and science a man may acquire power to make the gods tremble on their thrones.

The Buddha, then, is not a god; he is the ideal of what any man may become; and the great object of Buddhist worship is to keep this ideal vividly in the minds of the believers. In the presence of the statue, the tooth, or the footprint, the devout believer vividly recalls the example of him who trod the path that leads to deliverance. This veneration of the memory of Buddha is perhaps hardly distinguishable, among the ignorant, from worship of him as a present god; but in theory, the ritual is strictly commemorative, and does not necessarily involve idolatry, any more than the garlands laid on the tomb of a parent by a pious child. See TOPE.

The prayers addressed to the Buddha are more difficult to reconcile with the belief in his having ceased to exist. It is improbable, indeed, that the original scheme of Buddhism contemplated either the adoration of the statues of the Buddha or the offering of prayers to him after his death. These are an aftergrowth—accretions upon the simple scheme of Gautama, and in a manner forced upon it during its struggle with other religions. For a system of belief that seeks to supplant other systems finds itself enticed to present something to rival and outdo them, if possible, in every point. Even the Christian Church, in the Middle Ages, adopted with this view many of the rites and legends of paganism that were quite inconsistent with its own character; merely casting over them a slight disguise and giving them Christian names. Prayer, too, is natural to man—an irrepressible instinct, as it were, and had to be gratified. And then the inconsistency in uttering prayers when there is no one to hear or answer, glaring as it appears to us, is by no means great to the Eastern mind. Prayers, like other formulas, are conceived less as influencing the will of any superior being to grant the request than as working in some magical way—producing their effects by a blind force inherent in themselves. They are, in short, mere incantations or charms. Even the prayers of a Brahman, who believes in the existence of gods, do not act so much by inclining the deity addressed to favor the petitioner, as by compelling him through their mysterious potency—through the operation of a law above the will of the highest gods. The Buddhist, then, may well believe that a formula of prayer in the name of 'the venerable of the world' will be potent for his good in this way, without troubling himself to think whether any conscious being hears it or not.

The element in Buddhism which more than any other, perhaps, gave it an advantage over all surrounding religions, and led to its surprising extension, was the spirit of universal charity and sympathy that it breathed, as contrasted with the exclusiveness of caste. In this respect, it held much the same relation to Brahmanism that Christianity did to Judaism. It was, in fact, a reaction against the exclusiveness and formalism of Brahmanism—an attempt to render it more catholic, and to throw off its intolerable burden of ceremonies. Buddhism did not expressly abolish caste, but only declared that all followers of the Buddha who embraced the religious life were thereby released from its restrictions; in the bosom of a community who had all equally renounced the world, high and low, the twice-born Brahman and the outcast were brethren. This was the very way that Christianity dealt with the slavery of the ancient world. This opening of its ranks to all classes and to both sexes—for women were admitted to equal hopes and privileges with men, and one of Gautama's early female disciples is to be the supreme Buddha of a future cycle—no doubt gave Buddhism one great advantage over Brahmanism. The Buddha, says Max Müller, "addressed himself to castes and outcasts. He promised salvation to all; and he commanded his disciples to preach his doctrine in all places and to all men. A sense of duty, extending from the narrow limits of the house, the village, and the country, to the widest circle of mankind, a feeling of sympathy and brotherhood toward all men, the idea, in fact, of humanity, were first pronounced by Buddha." This led to that remarkable missionary movement, already adverted to, which, beginning B.C. 300, sent forth a succession of devoted men, who spent their lives in spreading the faith of Buddha over all parts of Asia.

BIBLIOGRAPHY. Koeppen, *Die Religion des Buddha* (Berlin, 1857-59); Barthélemy Saint-Hilaire, *Le Bouddha et sa religion* (Paris, 1862); Obry, *Du Nirvana bouddhique* (Paris, 1863); Max Müller, *Buddhist Nihilism* (London, 1869); Kistner, *Buddha and His Doctrines* (London, 1869), with a complete bibliography; Vasilyeff, *Der Buddhismus, etc.*, translated from the Russian by Benfey (Saint Petersburg, 1870); Alwis, *Buddhist-Nirvana* (Colombo, 1871); Feer, *Etudes bouddhiques* (Paris, 1873); Burnouf, *Introduction à l'histoire du bouddhisme Indien* (Paris, 1876); Wurm, *Der Buddha* (Gütersloh, 1880); Oldenberg, *Buddha: Sein Leben, seine Lehre*, etc. (Berlin, 1881; 3d ed., 1897), English translation by William Hoey (London, 1882); Lillie, *Buddha and Buddhism* (London, 1881); Arnold, *The Light of Asia* (London, 1882); Bastian, *Der Buddha in seiner Psychologie* (Berlin, 1882); Senart, *Essai sur la légende de Bouddha*, etc. (Paris, 1882); Seydel, *Das Evangelium und die Buddhasage* (Leipzig, 1883); Rockhill, *The Life of Buddha*, etc. (London, 1884); Kern, *Geschiedenis van het Buddhisme in Indië* (Haarlem, 1884); Eitel, *Buddhism: Its Historical, Theoretical, and Popular Aspects* (London, 1884); Titcomb, *Buddhism* (London, 1883); Bigandet, *Life or Legend of Gautama* (London, 1886); Sir Monier Williams, *Buddhism in Its Connection with Brahmanism* (London, 1888); Jennings, *The Indian Religions* (London, 1890); Rhys-Davids, *History and Literature of Buddhism* (London, 1895; New York, 1896); Kern, *Manual of Indian Buddhism* (Strassburg, 1896); La Vallée-Poussin, *Bouddhisme: études et matériaux* (Brussels, 1898). Consult also, for Chinese Buddhism: Beal, *Buddhism in China* (London, 1884); Edkins, *Chinese Buddhism* (London, 1880); and Schott, *Der Buddhismus in Hochasien und China* (Berlin, 1845). For Tibetan: Schlagintweit, *Buddhism in Tibet* (Leipzig and London, 1863); Waddell, *The Buddhism of Tibet or Lamaism* (London, 1895); and Grünwedel, *Mythologie des Buddhismus in Tibet und der Mongolei* (Leipzig,

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1900). For Siamese: Alabaster, *The Wheel of the Law* (London, 1871). Among the translations of or compilations from original works in Pāli, Sanskrit, Tibetan, and Siamese, the following are noteworthy: Burnouf, *Le Lotus de la bonne loi* (Paris, 1852); Hardy, *Eastern Monachism* (London, 1860), *Legends and Theories of the Buddhists* (ib., 1866), and *A Manual of Buddhism* (ib., 1880); Faucaux, *Histoire du Bouddha*, translated from the Tibetan (Paris, 1868); Schiefner, *Lebenbeschreibung Sakjamunis* (Saint Petersburg, 1849) and *Târanâtha's Geschichte des Buddhismus* (ib., 1869); Rogers, *Buddhaghosha's Parables* (London, 1870); Rhys-Davids, *Buddhist Birth Stories* (Vol. I., London, 1880; Vol. II., 1899); Warren, *Buddhism in Translations* (Cambridge, Mass., 1896); *Lalita Vistara*, by Râjendra Lāl Mitra and Lefmann; *Dhammapada*, by Fausböll, Beal, Waddell, Weber, and Max Müller; parts of the canon in *Sacred Books of the East*, Vols. X., XI., XIII., XVII., XIX., XXI., XXVI., XXXV., and LIX.; and the publications of the Pāli Text Society, edited by Rhys-Davids.

BUDDING. A method of reproducing plants and for perpetuating varieties by inserting a bud or bud-scion into a stock. There are numerous styles of budding, such as shield budding, square and circular shield budding, flute budding, and ring budding; here, however, only shield budding, the method in most common use, will be described. The bud is taken from wood of the present season's growth. Since the work of budding is done during the season of active growth, the bud-sticks are usually prepared so that the petiole or stem of each leaf is left attached, to serve as a handle to aid in pushing the bud home when inserting it beneath the bark of the stock. The stock for budding should be at least as thick as an ordinary lead pencil. With the apple and pear a second season's growth will be necessary to develop this size, but with the peach a single season will suffice, i.e. peach-stocks can be budded the same season the pits are planted; consequently the peach is left until as late in the season as is practicable in order to obtain suitable size of stocks.

The height at which buds are inserted varies with the operator. In general, the nearer the ground, the better. The cut for the reception of the bud is made in the shape of a letter T. Usually the cross-cut is made at a slight angle with the body of the tree, instead of at right angles to it, and the stem to the T starts at the cross-cut and extends toward the root for an inch or more. The flaps of bark caused by the intersection of the two cuts are slightly loosened with the ivory heel of the budding-knife, and the bud, grasped by the leaf-stem as a handle, is placed under the flaps and firmly pushed in place, until its cut surface is entirely in contact with the peeled body of the stock. A ligature is then tightly drawn about, above, and below the bud, to hold it in place until a union shall be formed. Bands of raffia 10 or 12 inches long make a most convenient tying material. As soon as the buds have united with the stock ('taken'), the ligature should be cut, in order to prevent girdling the stock and bud. This done, the operation is complete until the following spring, when all the trees in which the buds have 'taken' should have the top cut off just above the bud. This forces the entire strength of the root into the bud, and since the root itself had not been disturbed by transplanting, a more vigorous growth usually results from the bud than from scions in whip or crown grafting.

Budding is one of the most economical forms of artificial reproduction, and each year witnesses its more general use. Some nurserymen have gone so far as to use it as a substitute for all other modes of grafting, save whip grafting, in the propagation of the dwarf pear. Budding is economical in the amount of wood used from which to take buds or scions, since a single bud does the work of the three or more upon the scion of the cleft or whip graft. But it is expensive in the use of stocks, a seedling being required for each tree, while with the piece-root system of grafting two, three, or more stocks can be made from a single seedling.

The one objection to budding is that it causes an unsightly crook in the body of the tree, unless the tree is planted deeply enough in the orchard to cover the deformity. In rigorous climates, where trees upon tender roots are likely to suffer from severe winters, a bud of a hardy sort upon a tender root is no hardier than the root, because budding leaves a portion of the stock exposed above the surface of the soil, and thus precludes the possibility of the development of roots from the portion above the bud; while a piece-root grafted tree with a long scion is practically the same as a tree propagated from a cutting, as the scion will strike root and the new plant will be upon its own root. In regions where severe winters do not enter as a factor, there are undoubtedly a number of reasons why budding will be the most desirable method of reproducing horticultural varieties. See BUD, and GRAFTING.

BUDDLEA, bŭd-lē'yȧ. A genus of shrubs of the natural order Loganiaceæ, all natives of the warmer parts of the world, comprising about 70 species. Some of the hardiest are cultivated as ornamental shrubs. They blossom freely in summer, producing violet or yellow flowers in panicles or globuse heads. They are not quite hardy in the north. *Buddlea japonica, globosa, varabilis, lindleyana*, and *colvillei* are among the hardiest and most beautiful species.

BUDE (būd) **LIGHT.** A brilliant light obtained by introducing oxygen into the centre of an oil or gas flame. The 'Bude burner' employed for this purpose consists of two or more Argand burners arranged concentrically. The name is derived from Bude, England, the residence of Mr. Gurney, who invented the burner. The Bude light is comparatively expensive, and therefore seldom used.

BUDENZ, bōō'dânts, JOSEPH (1836-92). An Hungarian philologist. He was born at Rasdorf, Germany, and was educated at Marburg and Göttingen. In 1858 he went to Hungary, where he became a member of the Academy of Sciences (1862), and professor of comparative Altaian philology at the University of Budapest. His important and varied contributions to this subject include *Finn nyelvtan* ("Finnish Grammar," 5th ed., 1900), and *Magyar-ugor összehasonlító szótár* (1873-81).

BUDGE, ERNEST A. WALLIS. An English Orientalist. He was educated at Christ's College, Cambridge, where he became distinguished in the Semitic languages, and afterwards was appointed keeper of Egyptian and Assyrian antiquities in

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the British Museum. Of his numerous scholarly works may be cited: *Assyrian Texts* (1880); *Inscriptions of Nebuchadnezzar* (1883); *Babylonian Life and History* (1884); *The Dwellers on the Nile* (1885); *Coptic Martyrdom of George of Cappadocia* (1888); *History of Alexander the Great* (1889); *The Life of Rabban Hormizd* (1894); *Coptic Saint Michael the Archangel* (1894); *Oriental Wit and Wisdom* (1896); *Laughable Stories, Translated from the Syriac* (1899); *The Miracles of the Virgin Mary, The Life of Hannâ, Magical Texts of Za-Walda-Hawâr-Yât*, etc. (1900).

BUDGE, JULIUS (1811-88). A German physiologist. He was born at Wetzlar, and studied at the universities of Marburg, Würzburg, and Berlin. He afterwards successively became extraordinary professor at Bonn (1847-56) and professor of anatomy and physiology at Greifswald, where he was also director of the anatomical institute. He pointed out the relation between parts of the brain on the one hand and the genito-urinary organs on the other, and made the important discovery that the sympathetic nerve has its origin in the spinal cord, and not in the peripheral ganglia. He also discovered the capillaries of the gall. Among his principal works are the following: *Die Lehre vom Erbrechen* (1840); *Allgemeine Pathologie* (1843); *Lehrbuch der speziellen Physiologie des Menschen* (8th ed., 1862); *Kompendium der Physiologie* (3d ed., 1875).

BUDGELL, EUSTACE (1686-1737). An English essayist and miscellaneous writer. He studied at Trinity College, Oxford, and at the Inner Temple, and was admitted to the bar. In 1709 he was appointed a clerk, and in 1715 under-secretary to his second cousin, Joseph Addison, who in those years was Secretary for Ireland. He also held office as chief secretary to the lords justices and deputy clerk of the council, and was elected to the Irish House of Commons. In 1717, upon Addison's departure for England to become first Secretary of State, he obtained through him the lucrative post of Accountant-General. Soon, however, he quarreled with Webster, the new Secretary for Ireland, lost his places, and returned to England. Having invested in Law's South Sea scheme, he lost, he says, "above twenty thousand pounds . . . by that notorious piece of villainy." He wrote violent pamphlets against the Government, and from February, 1733, to June, 1735, published *The Bee*, a weekly periodical. Already in poverty, harassed by controversies and suits at law, and apparently mentally unbalanced, he was, in 1733, accused of having made away with a bond for £1000 advanced to him by Matthew Tindal, and with having entered interpolations in Tindal's will. The charge, though not proved, rendered him desperate, and he drowned himself in the Thames. He wrote for the *Spectator*, for the most part over the signature 'X.,' thirty-seven papers, of which "Sir Roger as a Hunter" (No. 116, Friday, July 13, 1711) is perhaps as good as any. He was also the author of a translation (1714) of the *Χαρακτῆρες* of Theophrastus, and of the *Memoirs of the Life and Character of the Late Earl of Orrery and the Family of the Boyles* (1732). For an autobiographic account of his grievances, consult his *Liberty and Property: A Pamphlet* (London, 1732).

BUDGERIGAR' (Anglo-Australian). A dealer's name (variously spelled) for the common Australian grass-parrakeet. Every one knows the little parrakeet, often called the Australian parrakeet, but which rejoices in such a multiplicity of names, among [them] . . . that by which it is most usually known in England, namely, budgerigar, undulated grass-parrakeet, zebra and shell parrot, warbling grass-parrakeet, etc. Consult *English Illustrated Magazine*, Vol. IX. (London, 1893). See PARRAKEET, and Plate of PARROTS AND PARRAKEETS.

BUDGET (Fr. *bougette*, bag, wallet, dim. of OF. *bouge*, a leather bag; hence a bag with its contents, as e.g. of news, information; cf. Lat. *fiscus*, originally basket, then money-basket, then public treasury). In its primary significance a term which designates the periodical financial statements laid before a legislative body. As such it embraces the report of receipts and expenditures for a prior fiscal period, and an estimate of the receipts and expenditures for a future period. From these preliminary estimates, which are the basis of legislation, the term has been extended to cover the aggregate of legislative enactments relating to the receipts and expenditures of a given period. The method of preparing and voting the budget varies greatly. An ideal budget would calculate revenue and expenditure with such nicety as to bring about an exact balance; but such precision is practically impossible except when the revenue system by its elasticity permits an adjustment of income to expenditure.

In England the Chancellor of the Exchequer submits to Parliament an annual statement of the expenditures deemed necessary by the Government. He is responsible for the entire expenditure, both in the departments of other ministers and in his own. It is therefore his duty to harmonize the estimates of the several ministers, and in so doing he may curtail the appropriations requested by some of his colleagues. The revenue as a whole is fixed and is not voted annually by Parliament. Yet it is the practice in England to regard the income tax and the tea duties as variable elements to be increased or diminished, as occasion arises. Proposals for such changes are an essential part of the budget.

In the United States the budget is practically prepared in the House of Representatives. To the latter at the opening of each session of Congress the Secretary of the Treasury submits a book of estimates of expenditures to be made for the coming fiscal year. He transmits without revision the estimates made by the several Cabinet officers, and the heads of offices not directly subordinated to the eight executive departments. These estimates form the basis upon which the several appropriation bills are prepared by the committees of the House of Representatives. Thus the work of preparing the budget is decentralized, and the adjustment of expenditures to income which results is not so satisfactory as in other countries. Although the term 'budget' is a component part of parliamentary language, it has not come into common use in the discussions of Congress. Consult: Wilson, *The National Budget* (London, 1882); Adams, *Finance* (New York, 1900). See FINANCE; TAXATION; DEBT, NATIONAL.

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BUDINGER, bu'ding-ēr, MAX (1828—). A German historian, born at Cassel and educated at the universities of Marburg, Bonn, and Berlin. He was professor of history at Zurich from 1861 to 1872, and at Vienna from 1872 to 1899. The scope of his researches is suggested by the following titles of some of his books: *Osterreichische Geschichte bis zum Ausgange des dreizehnten Jahrhunderts* (Vol. I., 1858); *Ein Buch ungarischen Kaisergeschichte* (3 vols., 1870); and *Die Universalhistorie im Mittelalter* (2 parts, 1893).

BŪDŌS-HEGY, bu'dēsh-hĕd'y' or BUDASBERG (Hung. *Büdös*, stinking, referring to the sulphurous exhalations, and *hegy*, mountain). A mountain belonging to the Carpathian system, situated near the southeastern border of Transylvania, in latitude 46° 12′ N. and longitude 25° 40′ E. It is quite isolated and steep-sided, densely wooded on the lower slopes, and has an elevation of about 4000 feet. It has numerous caverns, that emit sulphurous exhalations, and from its base issue strong sulphur springs.

BUDRUN, bōō-drōōn', or **BUDRUM,** bōō-drōōm'. A seaport town of Asiatic Turkey, in the Vilayet of Smyrna, finely situated on the north shore of the Gulf of Kos, about 96 miles south of Smyrna (Map: Turkey in Asia, B 4). It occupies the site of the ancient Halicarnassus, the birthplace of Herodotus and Dionysius, the historians, and the massive remains of the old city, which was 'the largest and strongest in all Caria,' bear witness to its former magnificence. A fortress, built by the knights of Rhodes in 1402, occupies a projecting rock on the eastern side of the harbor, which is shallow but well sheltered, and resorted to by Turkish cruisers. Population estimated at 6000.

BUDWEIS, bōōd'vis (Czech *Budějovice*, the district of hut villages, from Ger. *Bude*, Slav. *buda*, Engl. *booth*). A town of the Austrian Crownland of Bohemia, situated on the Moldau at its junction with the Maltsch, 1235 feet above the sea-level and about 77 miles south of Prague (Map: Austria-Hungary, D 2). Budweis is well built and has three suburbs. Its most noteworthy buildings are the cathedral, with a detached bell-tower; the old and the new Rathaus; the Gothic Church of Saint Mary, and the bishop's palace. The town's affairs are administered by a municipal council of 36 members. It owns its water-supply and gas-works. Its educational institutions, in which instruction is given in both the Bohemian and German tongues, include two gymnasia, two high schools, a teachers' seminary, agricultural, trade, and industrial schools, as well as numerous preparatory schools. Among its charitable institutions are a municipal hospital, a poorhouse, and an orphan asylum. Its industry consists of manufactures of earthenware, porcelain, majolica, lead pencils, sugar, beer, and spirits, and it has a considerable trade in grain, wood, and salt. In the neighborhood of the town stands the fine Castle of Frauenberg, belonging to Prince Schwarzenberg. The town has a comparatively high death-rate, which exceeds 25 per 1000. Population, in 1890, 24,500, of which 40 per cent. were Germans, 60 per cent. Czechs; in 1900, 39,400. Budweis was founded in 1265 by King Ottokar II. After the Thirty Years' War it received many privileges, and became in 1783 the capital of an episcopal see.

BUDWORM. See BOLLWORM.

BU'EL, SAMUEL (1815-91). An American clergyman, born in Troy, N. Y. He graduated at Williams College in 1833, and at the General Theological Seminary (N. Y.) in 1837, and was rector in Marshall, Mich.; Schuylkill Haven, Pa.; Cumberland, Md.; Poughkeepsie, N. Y., and New York City. Subsequently he was professor successively of ecclesiastical history and of divinity at the Seabury Divinity School, Faribault, Minn., and from 1871 to 1888 professor of systematic divinity and dogmatic theology at the General Theological Seminary. His publications include *The Apostolic System of the Church Defended* (1844) and *The Eucharistic Presence, Sacrifice, and Adoration* (1874).

BUELL, DON CARLOS (1818-98). A distinguished American soldier, prominent on the Federal side in the Civil War. He was born near Marietta, Ohio, within the limits of the present Lowell; graduated at West Point in 1841, and served in Florida in 1841-42 against the Seminoles, on the frontier of Louisiana in 1844-45, and in Texas in 1845-46. During the Mexican War he participated in the battles of Palo Alto, Resaca de la Palma, and Monterey under General Taylor, and in those of Cerro Gordo, Contreras, and Churubusco under General Scott, and for his gallantry at Churubusco, where he was severely wounded, was brevetted major. Until the outbreak of the Civil War he served as assistant adjutant-general of various departments in turn, and in May, 1861, was appointed brigadier-general of volunteers. He assisted for two months in organizing the army at Washington, and in November replaced Gen. W. T. Sherman in command of the Department of Ohio (the newly reorganized and enlarged Department of the Cumberland). He occupied Bowling Green, Ky., on February 14, 1862, and, advancing into Tennessee, took possession of Nashville on February 25. On March 21 he was raised to the rank of major-general of volunteers, his department at the same time being merged into that of the Mississippi, then under the command of General Halleck. On April 6-7 he took a prominent part in the battle of Shiloh, bringing his fresh troops upon the field toward the close of the first day's fighting, and on the following day helping to defeat the weakened Confederates. (See SHILOH, BATTLE OF.) On June 12 he assumed command of the Army of the Ohio, and soon afterwards was called upon to repel Bragg's invasion of Kentucky. After an exciting march he arrived first at Louisville on September 24, and then, turning upon the Confederate Army, forced it to retreat, overtook and crippled it at Perryville on October 8 (see PERRYVILLE, BATTLE OF), and pursued it across the State, though, according to some military critics, his pursuit was marked by an unfortunate lack of enterprise and vigor. On the 24th he was replaced by General Rosecrans, and from November, 1862, to May, 1863, was before a military commission appointed to investigate his campaign in Tennessee and Kentucky. This commission presented an adverse report, which, however, has never been published in full. Buell refused to accept any further assignments to active duty, though several were offered him, and on June 1, 1864, he resigned from the service. After the war he was president of the Green River Iron Works from 1865 to 1870, and served as United States pension agent at Louisville, Ky., from 1885 to 1889. There has been much

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discussion with regard to his career as a soldier, but by the majority of military critics he is considered to have been an able officer and a good strategist, whose usefulness was impaired by an unfortunate lack of tact in dealing with his subordinates, and especially with civilians, and a tendency at times to be somewhat dilatory in his movements. His own side of the controversy with regard to the Kentucky and Tennessee campaign is presented in the *Statement of Major-General Buell in Review of the Evidence Before the Military Commission Appointed by the War Department*, and in Fry, *Operations of the Army Under Buell* (New York, 1884).

BUELL, MARCUS DARIUS (1851—). An American theologian, born in Wayland, N. Y. He was educated at Boston University School of Theology, at Cambridge, England, and at the University of Berlin. He became professor of New Testament Greek and exegesis at Boston University in 1884, and dean of the theological faculty of that institution in 1889. His principal work is entitled *Studies in the Greek Text of the Gospel of Saint Mark* (1890).

BUENA VISTA, bwā'nâ vēs'tâ (Sp., good view). A small settlement in Mexico on the San Juan, a tributary of the Rio Grande, 7 miles south of Saltillo. Here, on February 22 and 23, 1847, during the war between the United States and Mexico, about 4800 Americans under General Taylor defeated fully 20,000 Mexicans under Gen. Santa Anna in the most brilliant battle of the war. The Americans, having taken up a position of great strength on the 21st, stood on the defensive and awaited Santa Anna's attack. On the afternoon of the 22d the Mexicans began the battle, though the main attack was made on the 23d, the conflict continuing with slight intermission throughout the day, and the troops on each side fighting with the utmost gallantry. The American artillery was served with remarkable efficiency, and Santa Anna's attacks were uniformly repulsed, so that early on the 24th he was compelled to retreat. The Americans lost 746 in killed and wounded, the Mexicans fully 2000. The battle virtually closed the campaign in the north, and, by weakening and detaining Santa Anna, contributed materially to the successes of General Scott in the south. An incident during the battle furnished the theme of Whittier's famous poem, "The Angels of Buena Vista." Consult: J. H. Carleton, *The Battle of Buena Vista* (New York, 1848); H. H. Bancroft, *History of Mexico*, Vol. V. (San Francisco, 1885); and O. O. Howard, *General Taylor* (New York, 1892).

BUENAVISTA, SAN JOSÉ DE. See SAN JOSÉ DE BUENAVISTA.

BUEN AYRE, bwān ī'râ, or **BONAIRE** (Sp. *buen*, Fr. *bon*. fair, good + Sp. *ayre*, Fr. *air*, Eng. *air*). One of the West Indian islands, belonging to the Dutch, situated in latitude 12° 2′ N. and longitude 68° 22′ W., 30 miles east of Curaçao (Map: West Indies, N 8). It has an area of 129 square miles, and a population of (1899) 4926.

BUENDIA, bwān'dē-â, JUAN (1814—). A Peruvian general. He was born in Lima, entered the army at an early age, and gradually rose to the rank of general, in which capacity he put down the insurrection of Pierola in 1874. During the greater part of the Chilean War of 1879 he commanded the Army of the South. On November 8, at the head of a combined Peruvian and Bolivian force, he attacked a Chilean army numbering about 10,000 on the heights of San Francisco, but was utterly defeated and was compelled to retreat to his headquarters at Tarapacá, where, rallying his demoralized army, he repulsed the pursuing Chileans and captured a large part of their artillery. He then withdrew to Arica and afterwards participated in the defense of Lima.

BUENOS AYRES, bwā'nôs ī'râs (Sp., good air; see BUEN AYRE). The largest and most important province of Argentina, on the eastern coast, bounded by the river Paraná and the provinces of Santa Fé and Córdoba on the north, by the Atlantic on the east and south, and by the Territory of La Pampa and the Province of Córdoba on the west (Map: Argentina, E 11). Area, 118,000 square miles. Excepting the southern part, which is crossed by two mountain chains, the province consists of an extensive plain dotted with small lakes and intersected in every direction by short streams. The coasts are generally low and sandy, and only slightly indented, though the southeastern part has a number of promontories. The chief rivers of the province are the Paraná (with its estuary, the Plata River), which borders it on the northeast, and the Rio Salado. There is however, no scarcity of water, as the numerous lakes and lagoons are connected by short streams, too shallow for navigation, but of considerable value for purposes of irrigation. The climate is healthful, with a temperature considerably reduced by sea breezes. The southern wind which blows in summer occasionally reaches the velocity of a hurricane, when it is known as the Pampero, and is at times quite destructive. The soil is very fertile, and especially adapted to grazing and the growing of cereals, though at present the raising of domestic animals is by far the leading occupation. The wealth in live stock was estimated in 1895 at about 52,000,000 sheep, 7,200,000 cattle, and 1,700,000 horses. During recent years the live-stock interests have shown a tendency to decline, due in a measure to the increased activity in agricultural pursuits. The cultivation of wheat has of late been receiving more attention, and corn, which is used in the local distilleries, is raised in large quantities. The commerce and shipping are naturally very extensive, both on account of the large volume of local products and from the fact that through its geographical position the province controls the foreign commerce of the republic. The chief exports are wool, beef, and other animal products. Of manufactured products very little is left for export, after domestic consumption. Railways connect all important centres, affording excellent transportation facilities.

In its administration the province is entirely independent of the central Government, not only in local affairs, but also in external financial transactions. The executive power is vested in a Governor and Vice-Governor, elected indirectly for a period of three years. The legislative power is exercised by a Congress consisting of a Chamber of Deputies of not more than 100 members, elected biennially, and a Senate of not more than 50 members, elected triennially. Congress holds annual sessions from May 1 to August 31. The whole province is divided into four sections

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for judicial purposes, and there is a Supreme Court at La Plata. Administratively the province is composed of 100 districts, under the control of their chief municipalities. Capital, La Plata. Population, in 1881, 684,555; in 1895, 921,168; in 1900 (estimated), 1,140,067.

BUENOS AYRES. The capital of Argentina (Map: Argentina, F 10), on the southern bank of La Plata River, 175 miles from its mouth, and 125 miles west of Montevideo (latitude 34° 36′ 21″ S., longitude 58° 21′ 33″ N.). The river here is 30 miles wide, and the city is only 15 to 25 feet above sea-level, in a flat plain. Buenos Ayres enjoys a moderate temperature, which does not vary greatly (the average being 62.6° F.), and which usually ranges between 79° in January and February and 55° in July and August. Winds and rainstorms are frequent. The city has an area of 72 square miles, and is regularly laid out, the streets for the most part crossing at right angles. They are lighted by gas, petroleum, and electricity, and compare favorably in appearance with those of large European cities. There are many beautiful thoroughfares, squares, and parks, the finest avenue being the Avenida de Mayo, 98.5 feet wide. The Plaza de la Victoria, over 1200 feet long and 640 feet wide, is surrounded by many handsome buildings, such as the episcopal palace, the cathedral, the hall of Congress, the exchange, the post-office, the Government Palace, the Palace of Justice, the municipal building and department of police, and the Hotel Argentina. In the middle of the square stands a magnificent statue of Liberty upon a handsome column; and an equestrian statue of General Belgrano is erected before the Government Palace. At the northern end of the city is the Parque Tres de Febrero (3d of February), of 300 acres, containing zoölogical gardens, an aquarium, lakes for boating, etc. There are several Roman Catholic and Protestant churches besides the cathedral, a magnificent edifice in the style of the Madeleine, Paris. The city has about twenty theatres, of which the most important is the Teatro de la Opera. There are also a race-track, situated in the suburb of Palermo, and public places for games and athletic sports.

ADMINISTRATION AND PUBLIC INSTITUTIONS. The city is divided into 14 sections, which elect the municipal council, and for the administration of justice into 20 districts, each with a justice of the peace. Numerous electric and horse tramways facilitate communication throughout the city. There are six railroad companies connecting Buenos Ayres with the north, south, and west, while numerous steamers run from here to Montevideo and towns along the Paraná and Uruguay rivers as far as the confines of Brazil. The city is connected with foreign countries by cable, and has an extensive telegraph and telephone system.

Primary education is provided in more than 220 schools, with nearly 60,000 pupils. There are four colleges for secondary education, including commercial and normal schools. The National University, founded in 1821, ranks among the finest in South America. It possesses a library of 36,000 volumes. There are two public libraries, the municipal and the Saint Christopher. The number of private schools exceeds that of public schools, and there are also various professional institutions, a museum of natural history, with the famous Burmeister collection, and numerous scientific and literary societies and clubs. The newspapers and periodicals published in the city number more than 100, 25 of them being issued daily, in Spanish, German, Italian, French, and English. There are 15 hospitals for French, German, English, Italian, and Spanish patients, and one for women, besides lunatic, foundling, and orphan asylums, and a shelter for immigrants, the last being aided by the State. The city also maintains shelters for the night, a Pasteur institute, and a crematory. There are many philanthropic societies, notably the Sociedad de Beneficencia, founded by Bernardino Rivadavía in 1823, and composed of women, and those founded for the care of immigrants of the different nationalities.

On account of the low situation of the city, improved methods of drainage and house and street cleaning have been put into operation, the refuse collected being burned by the city. Water is supplied by the municipality, drawn from the La Plata just north of the city, and purified by filtration. There is a well-organized system of police and fire protection. Formerly Buenos Ayres was at a disadvantage because of the lack of a harbor, the Plata being so swift and shallow at this point that sailing vessels had to anchor 14 miles down the river, the cargoes being transported to the city in lighters. At present there is a large and complete system of basins along the water-front, permitting vessels of 22 feet draught to dock within a short distance from the principal business portion of the city, and to connect at the water's edge with the railroad terminals.

MANUFACTURES AND TRADE. There is considerable manufacturing, the numerous factories in the city giving employment to more than 100,000 persons. The principal establishments are those manufacturing furniture, carriages, machinery, leather, shoes, hats, woven goods, tobacco, and liquors. Buenos Ayres is the port for more than one-half the exports of the entire country, the annual value of which is equal to about $150,000,000. The most important articles of export are wool, sheep, and cattle products, as well as live stock, and notably grain. Exports go chiefly to Europe, though the city has a large trade with the United States. The total tonnage of the vessels entering the port at its three harbors, Puerto Madero, Puerto Riachuelo, and Rada, exceeds 3,000,000 tons annually, and includes over 2200 sailing vessels of less than 500,000 tons, and over 2300 steamers of more than 2,500,000 tons.

POPULATION. Buenos Ayres contains a large proportion of foreigners; over 80 per cent. of all immigrants to Argentina land here. Its growth dates from the middle of the Nineteenth Century. In 1801 it had 40,000 inhabitants; in 1852, 76,000; in 1869, 178,000; in 1895, 663,854; in 1900, 800,951, of which about 50 per cent. are foreign, mostly Italians, Spaniards, and French.

HISTORY. Buenos Ayres has played an important part in South American history. Founded in 1535 by Don Pedro de Mendoza, it received the name of Ciudad de la Santísima Trinidad y Puerto de Santa María de Buenos Ayres, after Our Lady the Virgin Mary of good airs or winds. After being twice destroyed by the natives, the city was firmly established in 1580. It successfully resisted attempts of the French and Dutch

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to capture it during the Seventeenth Century, and in 1776 it became the capital of the new viceroyalty of the Rio de la Plata or Buenos Ayres. After driving out the English, who had taken the city by surprise, in 1806, the inhabitants repelled another attack in the following year. The congress which proclaimed the independence of the country from Spain on May 22, 1810, met here, and the city became capital of the Republic of the United Provinces of the River Plata in 1826. The port was blockaded by the French and English in 1845. After the struggle between Rosas and Urquiza in 1851, Buenos Ayres seceded from the Republic, and till 1859 formed, with the surrounding province, a separate State. Since that time the city has been part of the confederation, and, by a decree of 1880, has been definitely made the capital of Argentina and is divided from the province bearing its name. In 1871 the city suffered a terrible epidemic of yellow fever.

Consult: Turner, *Argentine and the Argentines* (New York, 1892); Bureau of the American Republics, *Handbook of Argentine Republic, Bulletin 67* (Washington, 1892); *Anuario estadistico de la ciudad de Buenos Aires;* Curtis, "Buenos Ayres," in *The Chautauquan*, Vol. XXIX. (Meadville, Pa., 1899).

BUENOS AYRES, UNIVERSITY OF (*Universidad Nacional de Buenos Aires*). The largest educational institution in South America. It had, in 1900, some 2665 students. Its faculties include law and government, mathematics, science, and philosophy.

BUFARIK, bōō'fä-rēk'. See BOUFARIK.

BUFF, bōōf, HEINRICH (1805-78). A German physicist and chemist. He was born at Rödelheim, near Frankfort, and studied at the universities of Göttingen and Giessen (under Liebig), and with Gay-Lussac in Paris. He was for many years professor of physics at the University of Giessen. His principal works are the following: *Grundzüge des chemischen Teils der Naturlehre* (1832); *Grundriss der Experimentalphysik* (1853); *Lehrbuch der physikalischen und theoretischen Chemie*, in collaboration with Kopp and Zamminer, as Vol. I. of Otto's well-known *Lehrbuch der Chemie* (3d ed. 1885). He was associated with Liebig in founding (1847) the celebrated *Jahresbericht über die Fortschritte der Chemie.*

BUFFALMACCO, bōō'fäl-mäk'kô, BUONAMICO. The adopted name of Buonamico Christofani, an Italian painter of the Florentine School, who is supposed to have lived in the Fourteenth Century. He is reported by Vasari to have been a pupil of Andrea Tafi, and to have executed the splendid frescoes in the hall of the Campo Santo in Pisa, illustrating the Passion, as well as a number of paintings in Bologna and Assisi. He is mentioned in the novels of Boccaccio and Sacchetti; and, in the absence of reliable information concerning him, is believed by many to have been a mythical figure.

BUFFALO (Sp. *búfalo*, Med. Lat. *bufalus*, Lat. *bubalus*, wild ox, from Gk. *βούβαλος*, *boubalos*, a species of African antelope). Properly, an ox of the restricted bovine genus Bubalus, and specifically *Bubalus buffelus*, of India. The word, however, has been broadly applied not only to many heavy oxen, such as those of Africa, and to the American bison (see BISON), but also to certain large antelopes (see BUBALIS, to which, perhaps, it originally belonged), and to other large ruminants; thus the city of Buffalo, N. Y., probably derives its name through a misnomer by early wanderers of the wapiti. The buffaloes proper form a group of oxen "chiefly characterized by their more or less flattened and angulated horns, which incline upward and backward, with an inward curve toward their tips, and are placed before the . . . vertex of the skull." The type is the INDIAN or WATER BUFFALO, of which small wild herds still exist in many parts of India, the finest belonging to Assam and Burma. This animal, called by the natives 'arnee' (Hind., masc. *arna*, fem. *arni*), is the largest of wild cattle, standing 6 feet high at the withers, and having a spread of horns sometimes exceeding 6 feet. It is bluish-black, nearly hairless, and frequents swampy jungles, where it is regarded as exceedingly dangerous, as it will charge a man entirely unprovoked, and when, perhaps, its presence is unsuspected. A band forming a circle, with lowered heads, around the cows and calves defy the bear or tiger, and a lone bull has been known to vanquish a tiger in single combat; combats between them have been a favorite sport among Indian princes. This buffalo has long been domesticated, first on the Indian plains, whence it was carried elsewhere in prehistoric times. It is highly valued in Malaya, China, and Japan, especially where rice is cultivated, and the *carabao* of the Philippines is only a variety of it. It reached Egypt very long ago, but subsequently to the era of the monuments and picture-writings; and it has gone far up the Nile, and will probably be carried much farther into the swampy region now opening to civilization, because of its usefulness in soft, wet lands, and its fondness for coarse aquatic vegetation in preference to dry and more costly forage. It has long been used, also, in the Niger Valley. It was introduced into Italy later than Roman times, and thrives in the Pontine marshes on the pestilential Maremma; and it plays an important part in western Asia, Turkey, Hungary, and southeastern Spain. "The buffalo loves mud and moist ground," says Hornaday (*Two Years in the Jungle*), "and nature has provided these broad splay feet to prevent the animal from sinking too deeply in the mud. He carries his head precisely like a camel, low down, with nose thrust far forward . . . and to look at the whole head one would say that the beast was created with especial reference to running rapidly through very thick brush." It is said to be far more powerful than the ox, and capable of dragging or carrying a far heavier load. The female yields a much greater quantity of milk than a cow, and of excellent quality, from which the *ghee* or semi-fluid butter of India is made. The hide is greatly valued for its strength and durability, but the flesh is very inferior to that of the ox. See CATTLE.

The AFRICAN BUFFALOES are of two species, the South African or Cape Buffalo (*Bubalus caffer*), which also extends northeasterly to Abyssinia; and the West African species (*Bubalus pumilus*). These may be separable into several distinct species or varieties. The typical and well-known South African buffalo is nearly the equal in size of the Indian one, and like it has a bluish-black hide, in old age almost completely hairless. Its horns, however, are somewhat

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shorter, and spread sideways, with up-curved ends, from the forehead, where the bases nearly meet in a broadly flattened expanse, making a rough buckler of horn. They frequent marshes and rivers, wading about in the water most of the time and eating the aquatic vegetation. Formerly they gathered in large herds, but now are rarely seen except in small bands, and they have disappeared entirely from all the settled regions. Their scent is remarkably keen, and they are warned of the approach of a disturber by the birds (see BUFFALO-BIRD), which remain near them and are vigilant. They are justly regarded as exceedingly dangerous by sportsmen, since when wounded they will charge with extreme speed and ferocity. They are, however, overcome by lions and leopards, and sometimes pulled down by crocodiles or chased to exhaustion by packs of wild dogs. This animal has not been tamed or domesticated; but its hide is much valued for its thickness and strength.

The West African species is of smaller size, has shorter and less massive horns, and is ruddy brown in color. Its habits seem to be closely similar to those of the more southern species, and it is widely distributed in Central Africa. The small wild ox of the Celebes is a near relative of the buffaloes. See ANOA. Compare, also, BANTENG; BISON; GAUR; YAK; EXTINCT ANIMALS. See Plate of BUFFALOES.

BUFFALO (named from Buffalo Creek). The county-seat of Erie County, N. Y., one of the most important commercial ports of the Great Lakes, and, next to New York, the largest city in the State (Map: New York, B 3). It is at the eastern end of Lake Erie, at the head of the Niagara River, 20 miles above Niagara Falls, 540 miles east of Chicago, 350 miles west of Albany, and 410 miles by rail northwest of New York.

DESCRIPTION. The city occupies an area of slightly less than 51 square miles, on ground rising gradually from the lake to an extended plain at an elevation of 50 feet (altitude 600 feet above sea-level). The streets generally are broad and cross each other at right angles, are beautifully shaded and well paved, considerably more than half (336 miles) of the total street mileage being paved, and two-thirds of this distance (223 miles) with asphalt. Main Street, the principal business thoroughfare, runs northerly from the lake-front; and Lafayette Square, where Niagara Street, the main road to Tonawanda, starts from Main Street on a diagonal line, is the centre of the business district. Here are the large office buildings, including many tall, steel-framed structures. The residential sections of Buffalo are marked by the large proportion of detached houses owned by the occupants. In the fashionable district the principal avenues are Delaware Avenue and North Street; here the houses are surrounded by ample lawns and trees and shrubs, which give this section of the city the picturesque appearance of a suburb. The same features of domestic architecture are carried out in the newly developed sections of the North Side. Many handsome buildings adorn the city; among these mention may be made of the new United States Government Building, which cost about $2,000,000; the city and county hall, of granite, with a tower 245 feet high; the State Armory and Arsenal; Music Hall; Merchants' Exchange; Masonic Temple; Y. M. C. A. Building; Fitch Institute; General Hospital; State Insane Asylum; the Erie County Penitentiary; Buffalo Library; Grosvenor Library; the Roman Catholic and Protestant Episcopal cathedrals; Board of Trade Building; the Erie County Savings Bank; Buffalo Savings Bank; Mutual Life and Prudential buildings; the D. S. Morgan Building; and Ellicott Square, the last named covering an entire block, and said to be the largest office building in the world.

The Buffalo street railways were among the first to adopt electric traction and the system of free transfers. Numerous lines, the entire system covering 185 miles, furnish transit to all sections of the city, and also to neighboring towns. An abundant water-supply is derived from the lake, and the sewerage system, comprising 416 miles of mains (140 paved with brick and 276 with tile), not only covers the whole city, but has a large outfall sewer discharging into the swift current of Niagara River.

The park system of Buffalo includes over 1000 acres, and consists of a chain of parks and parkways nearly encircling the city. The principal plots are the Front, of 45 acres, where the waters of the lake form themselves into the Niagara, and north of which is Fort Porter, a small military post; the North Side Park, of 365 acres, adjoining which are the State Insane Hospital grounds, of 200 acres, and Forest Lawn Cemetery, of 230 acres; the Parade, of 56 acres; Humboldt Park, and three large parks in the south; Stony Point, on the lake shore; South Park; and Cazenovia Park. Besides these, and the connecting park boulevards and circles, there are minor spaces scattered about the town aggregating about 60 acres. The principal public monuments are the Soldiers and Sailors', in Lafayette Square, and those to Red Jacket and President Fillmore, in Forest Lawn Cemetery.

INSTITUTIONS. Besides its many churches of all denominations, and a large variety of charitable institutions, Buffalo is noted as the home of the first Charity Organization Society in the country (founded in 1877). Its home in the Fitch Institute is the headquarters for a large amount of philanthropic work, prominent among which is the *crèche*, or day nursery for children whose mothers are at work, with its kindergarten and training school for nursery maids. Among other philanthropic institutions may be mentioned the Orphan Asylum, Home for the Friendless, Saint Vincent's and Saint Joseph's (Roman Catholic) orphanages, State Insane Asylum, Buffalo General Hospital, Church Home for Aged Women, Saint John's Orphan Home, Saint Mary's Asylum for Widows and Foundlings, Saint Mary's Institution for Deaf Mutes, and Ingleside Home for Erring Women.

Educational institutions are numerous and efficient, one-fifth of the annual tax levy being allotted to the educational department of the city. In addition to the public schools, which include three high schools, a training school for teachers, and many kindergartens, there are a State Normal School, the University of Buffalo, Saint Joseph's and Canisius's colleges (Roman Catholic), the German Martin Luther Seminary (Evangelical Lutheran), Academy of the Sacred Heart, Holy Angels' Academy, etc. Three municipal libraries, aggregating about 235,000 vol-

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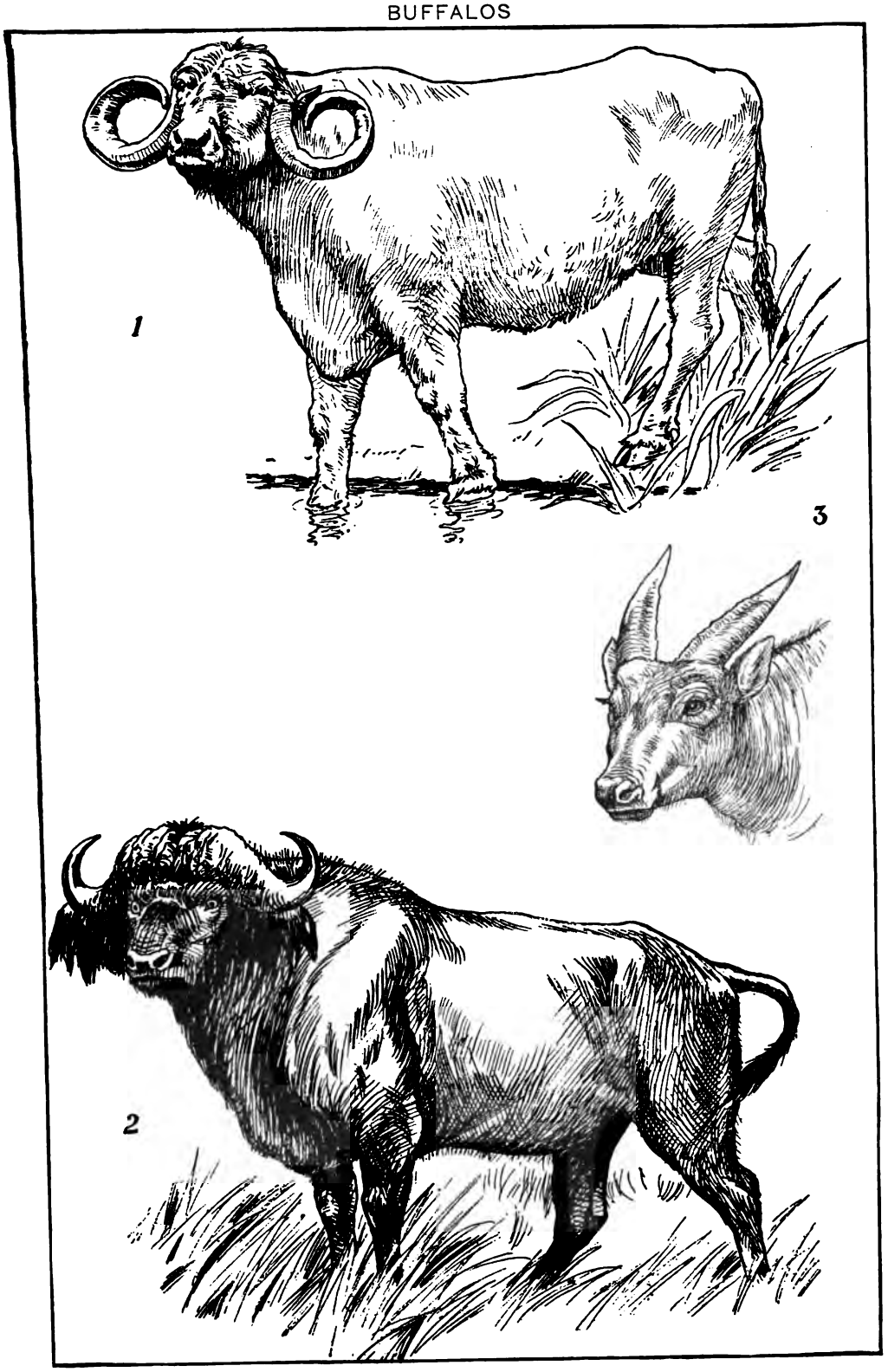
BUFFALOS



1. ASIATIC WATER BUFFALO (Bos bubalus). 2. AFRICAN BUFFALO (Bos caffer).
3. SAPI-UTAN (Anoa depressicornis).

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imes, are supplemented by school and collegiate, ind Historical Society, Society of Natural Sciences, Law (Eighth Judicial District), Erie Railroad, German Young Men's Association, Lutheran Young Men's Association, Merchants' Exchange, and Y. M. C. A. libraries. The Buffalo Library Building is occupied also by the Historical Society and Society of Natural Sciences, both of which have interesting collections in their particular lines, and by the Fine Arts Academy.

COMMERCE AND INDUSTRY. Buffalo is one of he most marked of large American cities in its recent development, and owes its prosperity to ommerce. Although the city is so well located or a great commercial centre, originally the only iarbor was in the shallow water of Buffalo Creek. The United States Government has constructed i series of breakwaters, forming both an inner ind outer harbor, and is building a new breakvater to Stony Point, which will increase greatly the area protected from storms. The State ias constructed Erie Basin, at the terminus of he Erie Canal, and the city has deepened Buffalo Creek, and constructed a ship canal to increase the wharf facilities. There is now a vharf frontage of 8 miles, with ample room for further extensions along Niagara River and ilong the lake.

Several great steamship lines and innumerible independent vessels ply to the chief ports on the Great Lakes, and there are several ferries o the Canada side, besides the International Bridge, completed at a cost of $1,500,000. The ity is connected with the tide-waters of the Hudson by the Erie Canal, and with ports on Lake Ontario and the Saint Lawrence River by he Welland Canal, and is also the terminus or connecting-point of a score of railroads. Among them are the Lake Shore and Michigan Southern; Michigan Central; Grand Trunk; New York Central; West Shore; Lackawanna; Wabash; Pennsylvania; New York, Lake Erie ind Western; Lehigh Valley; Western New York and Pennsylvania; Buffalo, Rochester and Pittsburg; and New York, Chicago and Saint Louis. A belt-line railroad encircles the city, ifording valuable facilities for intercommunication.

The commerce of Buffalo by these various neans of transportation is very great. With i season of only about 246 days in the year, Buffalo ranks with the leading American and European ports in extent of traffic. The immense quantity of flour and grain moved from he Western States to the seaboard constitutes he most important feature of its commerce; but live stock, lumber, and coal, iron ore, and ish, also, are of importance. Some part of the umber and iron ore which arrive at this end of Lake Erie is received at Tonawanda (q.v.), i suburb to the north, on Niagara River, but Buffalo receives large quantities of each. Over 5,000,000 pounds of fish are received annually, nainly from Georgian Bay, and are distributed is far east as Boston and as far west as Denver. The horse market and sheep market of Buffalo ire the largest in the United States, and in the rade in cattle and hogs Buffalo is among the eading American cities. The material facilities or handling this enormous traffic form a most mportant feature of Buffalo. The first grain-elevator in the world was built in Buffalo in 1843, and now there are some fifty elevators, transfer towers, and floating elevators. These represent an investment of over $13,000,000, can handle in one day 5,000,000 bushels of grain, and store at one time 29,000,000 bushels. The coal-docks have a capacity of 29,000 tons a day, and on the eastern outskirts of the city are the enormous coal-stocking trestles, in which the railway companies keep their accumulated supply. In East Buffalo are the railroad stockyards, 75 acres in extent, affording transfer facilities for through freight, and sales-yards for the local supply of live stock.

In addition to vast commercial activities, Buffalo's manufacturing interests are extensive and varied. In the production of foundry and machine-shop products, including stoves, nails, etc., and agricultural implements, the city ranks among the foremost. Other industries are slaughtering and meat-packing, refining petroleum, and ship-building; clothing, flouring and grist-mill products, brick, stone, lime, and stucco, malt and distilled liquors, soap and candles, starch, furniture, and tobacco and cigars, are extensively produced. Besides these are immense establishments manufacturing saddlery and harness, cars, awnings, tents, sails, willow-ware, carriages, wagons, cutlery, patent medicines, surgical appliances, etc. Power from the new electric plant at Niagara Falls (q.v.), brought through three circuits with an aggregate capacity of 30,000 horse-power, is already used in Buffalo to a large extent, and the cheap and abundant supply from this source justifies the prediction of a rapid expansion of manufacturing industries in the near future.

The receipts for 1900 of the Buffalo post-office amounted to over $800,000, a figure which represents an increase of nearly 100 per cent. in the last decade.

GOVERNMENT, MUNICIPAL EXPENDITURES, ETC. The government is vested in a mayor, elected every four years; a bicameral city council; and administrative departments, of which the health, fire, police, civil service, and park boards are appointed by the mayor; the city clerk, elected by the council; and all other municipal officials chosen by popular vote.

Buffalo spends annually, in maintenance and operation, about $6,000,000, the main items of expense being about $1,140,000 for schools, $650,000 for interest on debt, $780,000 for the police department, $660,000 for the fire department, $190,000 for parks and gardens, $180,000 for street cleaning and sprinkling, $350,000 for the water-works, nearly as much for municipal lighting, $155,000 for charitable institutions, $110,000 for garbage removal, $100,000 for libraries. The water-works, which were built in 1868 at a total cost of over $9,100,000, are owned and operated by the city, the entire water-works system now including about 490 miles of mains. During recent years great municipal activity has been displayed in the improvement of the water-supply service; in the laying of asphalt pavements; in the construction of natural-gas mains, facilitating the substitution of this fuel for coal; in the removal, in the business district, of overhead telephone and telegraph wires to subways, in which are carried also the fire-alarm and police wires of the city; in the establishment of the great public library (1897) and of municipal baths;

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and in harbor improvements, supplemented by Government expenditure. The city has entered also into a plan to abolish railroad grade crossings, mostly at the expense of the railroads. Buffalo has a bonded debt of over $16,000,000, and the assessed valuation of property (real and personal) amounts to nearly $250,000,000.

POPULATION. Buffalo is one of America's most rapidly growing cities, as is shown by the following census figures: 1820, 2095; 1840, 18,213; 1860, 81,129; 1880, 155,134; 1890, 255,664; 1900, 352,387. During the last decade it rose in rank from eleventh to eighth place among the cities of the United States. The foreign born number 104,000, and the native born of foreign parents number 160,000. The Germans number over two-fifths of the total foreign born, the principal other nationalities represented being the Canadian, Irish, Poles, and English. The negro population is small—1600.

HISTORY. In 1679 La Salle visited this locality, and built near the present city the first ship that was navigated on Lake Erie—a little vessel of only 60 tons, called the *Griffin*. In 1792 there was only one settler here, a trader named Winney, and in 1795, according to the French traveler Liancourt, there was only "a small collection of four or five houses." In 1792-93 the Holland Land Company, so called, bought a large tract of land in this vicinity, which during 1798-1803 was laid out into townships by Joseph Ellicott. Influenced by Ellicott, commonly called the 'founder of Buffalo,' the proprietors decided, in 1801, to establish a town (New Amsterdam) at the mouth of Buffalo Creek, and in 1803-04 a village was laid out under Ellicott's supervision. Though legally New Amsterdam, this new village soon came to be called Buffalo, probably from the immense herds of bison which had formerly frequented the salt licks several miles away, and in 1810 the township of Buffalo, with limits including the present city, was incorporated. In 1811 the first newspaper, the *Buffalo Gazette*, was published, and in 1818 the first steamboat, *Walk-in-the-Water*, was built. On December 29, 1813, a British and Indian force of 1200 men, under General Riall, captured Buffalo, and on the 30th, and January 1, almost completely destroyed it by fire. In 1815 it was rebuilt, but its growth was very slow until after the completion of the Erie Canal in 1825, when it became a distributing centre between the East and the West. In 1832, with a population of 15,000, it became a city, and since 1857 it has been noted for its manufactures and commerce. In 1853 Black Rock, which for many years was Buffalo's great rival, was brought within the city limits. Buffalo was the home for a time of Millard Fillmore and Grover Cleveland, the latter serving as mayor in 1882. In 1901 (May 1 to November 1) the Pan-American Exposition was held at Buffalo. At this exhibition occurred the assassination of President McKinley, on Friday, September 6, 1901. See PAN-AMERICAN EXPOSITION.

Consult: Smith, *History of the City of Buffalo and Erie County* (Syracuse, 1884); Ketchum, *An Authentic and Comprehensive History of Buffalo* (Buffalo, 1864-65); and Powell, *Historic Towns of the Middle States* (New York, 1899).

BUFFALO. A town and county-seat of Johnson County, Wyo., in the northern part of the county (Map: Wyoming, F 3). The people are engaged principally in agriculture and stock-raising. Population, in 1890, 1087; in 1900, 710.

BUFFALO-BERRY (*Shepherdia argentea*). While familiar to horticulturists for many years, the buffalo-berry has but recently taken rank as a fruit-plant. It is a native of the cold, dry northwestern part of North America, where it has achieved its greatest success under cultivation. The buffalo-berry is a shrub with small silvery leaves, short thorny spines or branches, upon which the fruits, of about the size of a common currant, are borne. The plant is diœcious, consequently both male and female forms must be planted in order to insure fruit production. The two forms are easily recognized by the form and distribution of the winter buds; the staminate or male plant bears small rounded buds in dense clusters scattered all along the spurs; the pistillate, or female plant, bears fewer and more elongated buds, usually in pairs along the sides of the spurs. The fruits are either red or yellow, are used for jellies, and often serve instead of currants for this purpose. There are no cultivated varieties on the market. The plant is valuable as an ornamental shrub. See ELEAGNUS.

BUFFALO BILL. See CODY, WILLIAM F.

BUFFALO-BIRD. A bird closely associated with wild oxen or buffaloes, picking the parasites from their hides to eat, and warning the animal of possible danger by the expression of its own alarm. (1) An ox-pecker (q.v.). (2) A tick-bird (q.v.).

BUFFALO-FISH. One of several suckers (Catastomidæ) of the Mississippi Valley, comprised in the genus Bubalicthys or Ictiobus, and so called because of the humped outline of the back, the large head, and dark colors. The red-mouthed buffalo-fish (*Ictiobus cyprinella*) is brownish-olive, and reaches a length of nearly 3 feet, and a weight of 20 to 30 pounds. The big-mouthed one (*Ictiobus urus*) is also large and very dark, with all the fins black; while the small-mouthed (*Ictiobus bubalus altus*) is paler and more southerly in its habitat. The flesh is poor.

BUFFALO-GNAT. A gnat (*Simulium meridionale*), closely related and similar to the northern black fly (q.v.), which swarms in the valleys of the Mississippi and Missouri rivers. "They rival the mosquito in their bloodthirsty tendencies," says Howard, "and not only do they attack human beings, but poultry and domestic animals are frequently killed by them. . . . In certain seasons they multiply enormously, alight in thousands on cattle (as formerly they did on the bison), and produce death through their poisonous bites as well as from loss of blood. Unlike mosquitoes, they fly and bite in the daytime, and are often seen in large numbers flying in bright sunshine. The larvæ are aquatic, and unlike mosquitoes again, the larvæ of which live in stagnant water. Simulium larvæ frequent well-aërated and frequently swiftly running streams." Consult: Osborn, *Insects Affecting Domestic Animals* (Dept. of Agriculture, Washington, 1896).

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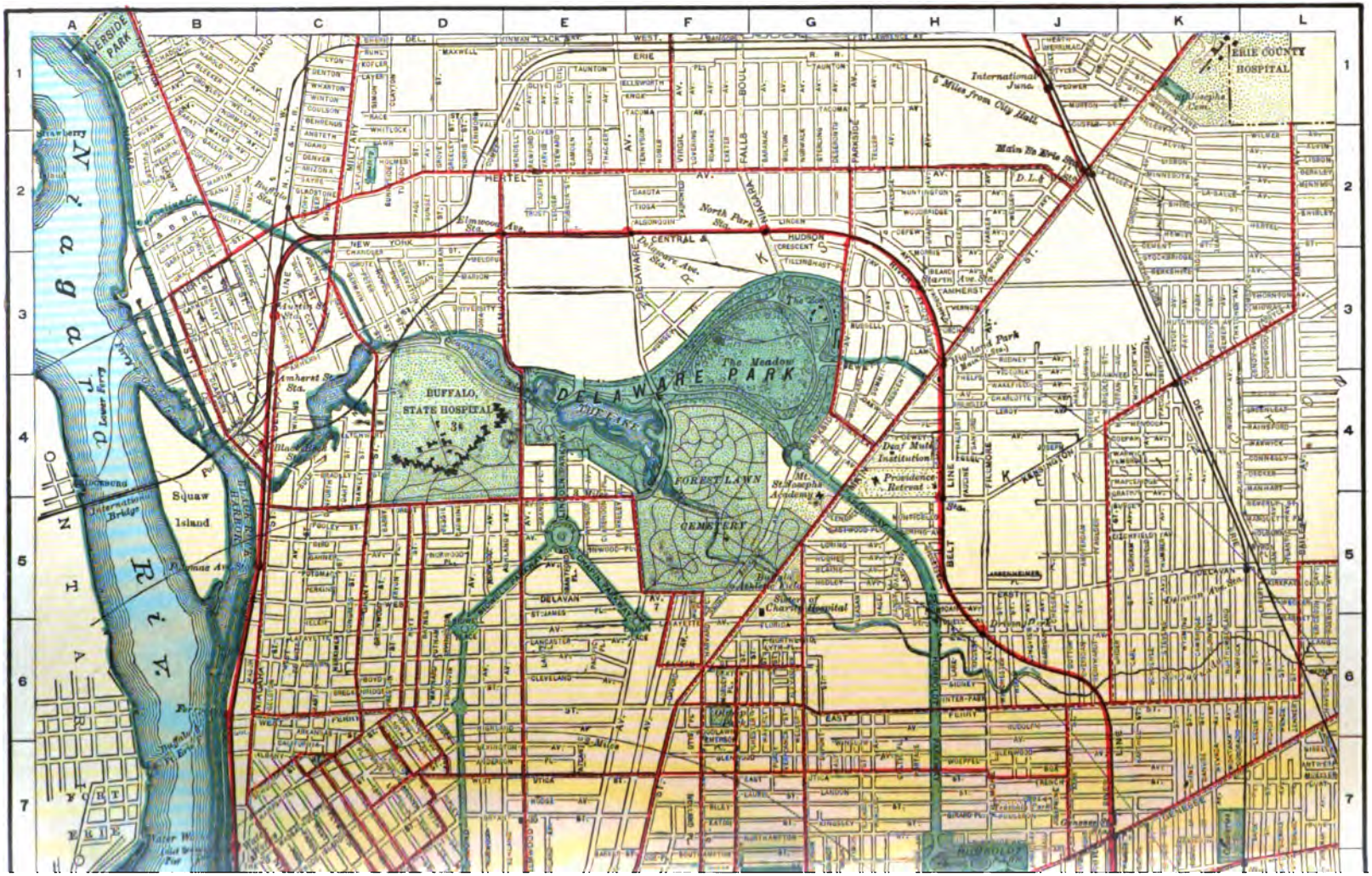
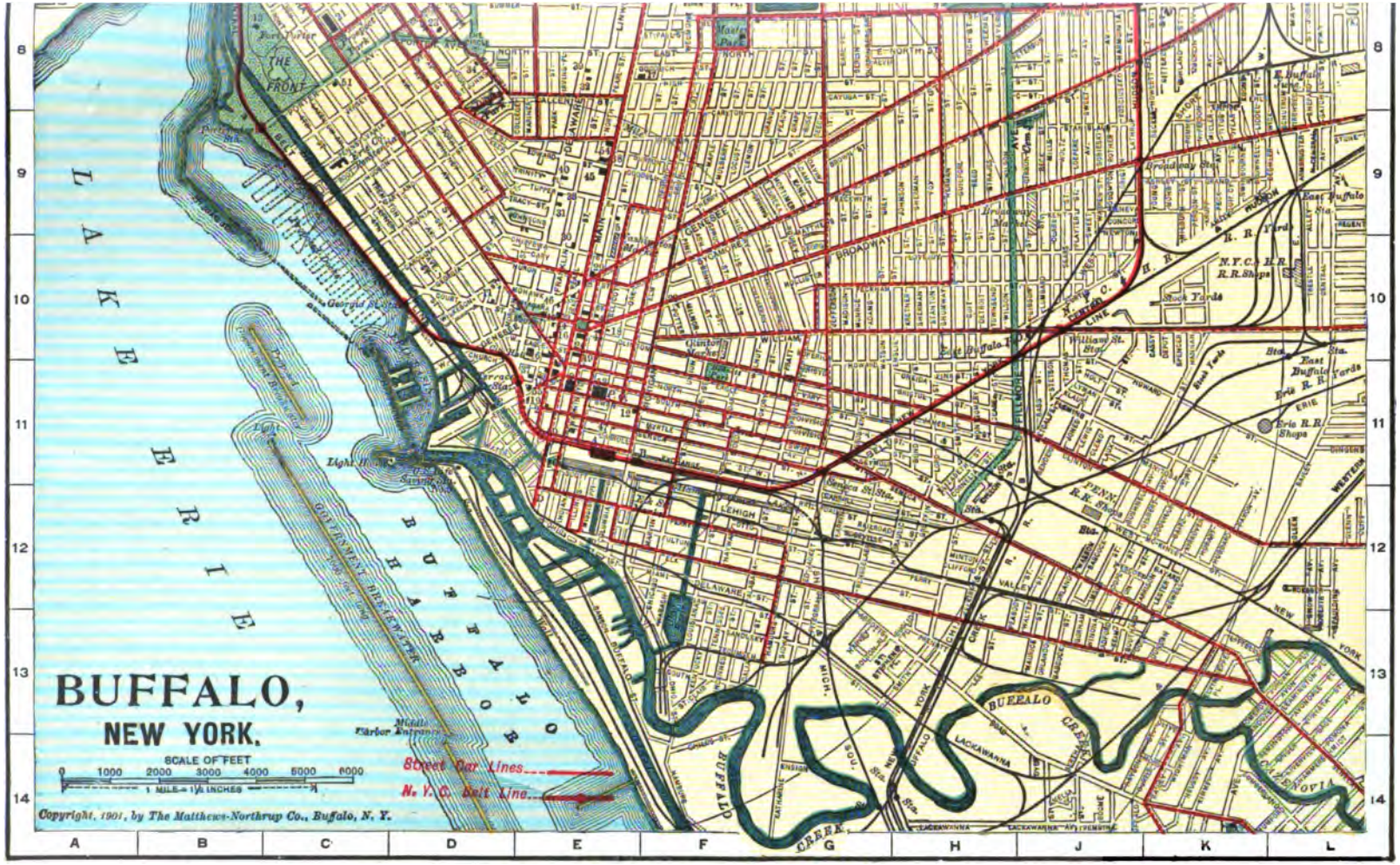

DELAWARE PARK
The Meadow
BUFFALO STATE HOSPITAL
FOREST LAWN CEMETERY
Squaw Island
Niagara River
Lake Erie
ERIE COUNTY HOSPITAL
Deaf Mute Institution
Providence Retreat
Mt. St. Joseph Academy
Sisters of Charity Hospital
International Junc.
5 Miles from City Hall
Main To Erie Sta.
Amherst St. Sta.
Black Rock Sta.
Elmwood Ave.
North Park Sta.
Delaware Ave. Sta.
Belt Line Sta.
Lower Rivr.
Interstate Bridge
Riverside Park
Strawberry Island
Hoyt Park
Highland Park
Forest Lawn Cem.
Buffalo Cem.
Delaware Park Lake
Hydraulic Canal
Tonawanda Creek
Tuscarora Creek
Buffalo Creek
Water Works Filter Bed
Water Works Pier
Lake Erie Terminal
Belt Line R.R.
Niagara Falls Div. N.Y.C.R.R.
Lake Shore & Mich. Sou. R.R.
Buffalo Creek R.R.
Tonawanda Div. N.Y.C.R.R.
Buffalo Div. N.Y.C.R.R.
Buffalo Div. L.S.&M.S.R.R.
Buffalo Div. B.C.R.R.
Tonawanda Div. L.S.&M.S.R.R.
Niagara Falls Div. L.S.&M.S.R.R.
Niagara Falls Div. B.C.R.R.
Tonawanda Div. B.C.R.R.
Belt Line Div. B.C.R.R.
Belt Line Div. L.S.&M.S.R.R.
Belt Line Div. N.Y.C.R.R.
Buffalo Div. Belt Line R.R.
Tonawanda Div. Belt Line R.R.
Niagara Falls Div. Belt Line R.R.
Belt Line Div. Belt Line R.R.
Buffalo Div. Lake Erie Terminal R.R.
Tonawanda Div. Lake Erie Terminal R.R.
Niagara Falls Div. Lake Erie Terminal R.R.
Belt Line Div. Lake Erie Terminal R.R.
Buffalo Div. Buffalo Creek R.R.
Tonawanda Div. Buffalo Creek R.R.
Niagara Falls Div. Buffalo Creek R.R.
Belt Line Div. Buffalo Creek R.R.
Buffalo Div. Tonawanda Creek R.R.
Tonawanda Div. Tonawanda Creek R.R.
Niagara Falls Div. Tonawanda Creek R.R.
Belt Line Div. Tonawanda Creek R.R.
Buffalo Div. Hydraulic Canal R.R.
Tonawanda Div. Hydraulic Canal R.R.
Niagara Falls Div. Hydraulic Canal R.R.
Belt Line Div. Hydraulic Canal R.R.
Buffalo Div. Tuscarora Creek R.R.
Tonawanda Div. Tuscarora Creek R.R.
Niagara Falls Div. Tuscarora Creek R.R.
Belt Line Div. Tuscarora Creek R.R.
Buffalo Div. Delaware Park Lake R.R.
Tonawanda Div. Delaware Park Lake R.R.
Niagara Falls Div. Delaware Park Lake R.R.
Belt Line Div. Delaware Park Lake R.R.
Buffalo Div. Niagara River R.R.
Tonawanda Div. Niagara River R.R.
Niagara Falls Div. Niagara River R.R.
Belt Line Div. Niagara River R.R.
Buffalo Div. Lake Erie R.R.
Tonawanda Div. Lake Erie R.R.
Niagara Falls Div. Lake Erie R.R.
Belt Line Div. Lake Erie



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BUFFALO-GRASS, or BUCHLOË (*Bulbilis dactyloides*). A common grass of the Western United States, ranging from Manitoba to Texas, where it is one of the best pasture grasses. It is a low, spreading grass seldom more than 6 inches in height. It spreads rapidly by runners, soon forming a dense sod. The grass is diœcious, the male flowers conspicuous, while the female flowers, which occur on a different plant, are easily overlooked. It is readily propagated by seed or sod, and is improved by cultivation. Sod transplanted from the plains to Washington, D. C., quickly covered the ground, and is perfectly adapted to its surroundings. It turns brown after frost, but during the summer presents a dense growth of fine herbage. It is apparently very nutritous and is relished by all kinds of stock.

BUFFALO-MOTH. See CARPET-BEETLE.

BUFFER (OE. *buffe*, slap, blow), BUFFING APPARATUS. An arrangement projecting from the frame of a railway car to prevent injury from violent contact or collision, or to deaden the effect of the concussions caused when the velocity of a part of the train is checked, or when the engine is starting the train. Buffers are used on passenger-cars in America, and consist of three parts—the head, the bar, and the stem. The stem passes through the spring and buffer-spring beam; the shoulder formed by the junction of the stem with the bar bears directly, or by means of a plate, against the spring, which is usually of the volute or spiral type. This buffer is placed at the centre of each end of the car. In English railway practice two buffers are used at each end of the car, one on each side of the centre. The general construction is much the same as that described above, except that flat springs, somewhat like a carriage-spring, are employed.

BUFFET, bụ'fâ', LOUIS JOSEPH (1818-98). A French politician. He was born at Mirecourt, Vosges, and in 1848 entered the Chamber of Deputies. Under the Presidency of Louis Napoleon he held the portfolio of Commerce and Agriculture. He afterwards became leader of a 'Tiers Parti,' which tried to reconcile liberal reforms with loyalty to the Government, and in January, 1870, joined M. Emile Ollivier's Cabinet as Finance Minister, but resigned in April. He was elected to the National Assembly (1871), of which he became president in 1873, and formed a Cabinet in 1875, taking the portfolio of the Interior. In this latter office, however, he made himself obnoxious to the Republican Party, and when, in 1876, he failed to secure a reëlection to the Assembly, he resigned. During the same years (1876) the Senate elected him a life member.

BUFFINGTON, ADELBERT RINALDO (1837—). An American soldier. He was born at Wheeling, W. Va., and graduated at West Point in 1861. He was brevetted major for meritorious service in the ordnance department in 1865, and has been commander successively of the United States ordnance depot at Wheeling, W. Va., and of the arsenals in New York, Baton Rouge, Watertown, Mass., Watervliet, Indianapolis, Pittsburg, Springfield, Mass., and Rock Island. In 1899 he was appointed chief of ordnance, and was raised to the rank of brigadier-general. He is the inventor of a magazine firearm, a 'rod-bayonet,' and a rear sight for military firearms. Many other improvements in firearms have been introduced by him.

BUFF LEATHER. A leather made out of salted and dried South American light oxhides and cowhides. Buff leather is very pliant, is not liable to crack or rot, and is used for soldiers' belts and cartridge-boxes. The natural color of the leather is light-yellow, but it is sometimes bleached white. It was formerly tanned soft and white and used for armor.

BUFFLEHEAD (from Fr. *buffle*, buffalo; referring to the size of its head). A fresh-water duck (*Charitonetta albeola*) of North America, so named from the apparent bigness of the head, due to the elongated feathers. It is also called 'butterball,' for its fatness, and 'dipper' and 'spirit duck,' from its amazing skill in vanishing and reappearing. The body-colors of the drake are black and white, with the crested head "rich, silky, dark metallic green, bronze, and violet purple," with a patch of white behind the eye. The female is dusky brown, with white markings. The length is about 13 inches. This small and beautiful duck frequents inland waters, especially deep lakes, on its spring and fall migrations, and is a favorite with sportsmen, but not common, and hard to get. It breeds from the Great Lakes and New Brunswick northward to the Arctic Circle, in holes in trees, or, in the absence of trees, in gopher-burrows and similar holes in banks, and lays about twelve eggs, larger and darker than those of a teal. See Plate of WILD DUCKS.

BUFFON, bụ'fôn', GEORGE LOUIS LECLERC, Comte de (1707-88). A French naturalist and philosopher. He was born in Montbard, September 7, 1707, and died in Paris, April 16, 1788. He received a liberal education and traveled in Italy and England. His father was an eminent lawyer and wished his son to follow his profession; but the boy evinced a stronger liking for the sciences, and devoted all his earlier life to studies in mathematics, physics, and agriculture. In 1739 he was elected a member of the Academy of Sciences and also appointed keeper of the Royal Gardens and Museum in Paris, out of which were subsequently formed the Jardin des Plantes and the Museum of Natural History. Here he lived for several months of each year, in a large house, which is still standing, and which, after his death, became successively the lodging-place of many famous naturalists. The remainder of the time he lived in the rural village of Montbard, where, and not in the presence of the specimens in the museum in Paris, his *Natural History* was written. His position, personal influence, and wealth enabled him to be of great service to several students who became eminent investigators, the most important of whom was Lamarck. Buffon himself was never an investigator, nor even an observer. He was a compiler and popularizer of scientific matters, which he presented in an attractive, even brilliant way, and upon which he framed theories and generalizations, some of which were notable as foreshadowing the evolutionary notions of the succeeding generation. "His single positive addition to zoölogical science," says Packard, "was generalizations on the geographical distribution of animals." His elaborate and picturesque theories in respect to the geological history of

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the earth were erroneous and fantastic, yet had the virtue, as was pointed out by Cuvier, of calling attention clearly to the fact that the history of life upon the globe was the history of a succession of advancing changes. Soon after taking charge of the museum he began the great work upon natural history, *Histoire Naturelle, Générale et Particulière* (44 volumes, quarto, Paris, 1749-1804), with which his name is most commonly associated, and which was completed by Lacépède after his death. It passed through several editions, and was the first work which brought together the information of the time in a manner interesting and intelligible to the general reader, illustrated by really good pictures.

Scattered through this work are passages of speculation and suggestion, which seem accidentally thrown out rather than carefully considered, and which are often so tinged with irony as to make it difficult for the modern critic to determine whether their author really believed what he said—an effect in part due, no doubt, to the danger of uttering new ideas in the political and social atmosphere of his time. Some of these suggestions seem definitely to anticipate the evolutionary ideas of Lamarck and the two Darwins, and to assert the mutability of species, but they are rarely complete in statement. He seems to have been most impressed with the influence of climate as a factor compelling variation in animals and species, and hints that thus many species in the past may have been extinguished or created. He even asserts, in a hypothetical way, the idea of the derivation of species by descent and variation from earlier forms, but follows it by a denial. Dr. A. S. Packard, who collected all the views of Buffon bearing upon biological evolution, as the term is now understood, concludes an examination of them as follows: "The tentative views of Buffon . . . would now be regarded as in a degree superficial and valueless. But they appeared thirty-four years before Lamarck's theory, and, though not epoch-making, they are such as will render Buffon's name memorable for all time."

Buffon was admitted to the French Academy in 1753, when he delivered as his inaugural address the famous *Discours sur le Style*. He was also perpetual treasurer of the Academy of Sciences, fellow of the Royal Society of London, and member of all the prominent scientific societies of Europe. He married in 1752, and his son became an officer of the French Army, and was executed in 1793 for political reasons. Consult: Flourens, *Histoire des Travaux et des Idées de Buffon* (Paris, 1844), and Packard, *Lamarck* (New York, 1901).

BUFFONE, bŭf-fō'nâ, CARLO. In Jonson's *Every Man Out of His Humour*, "a slave that hath an extraordinary gift in pleasing his palate, and will swill up more sack at a sitting that would make all the guard a posset. His religion is railing and his discourse ribaldry." He is intended as a caricature either of Marston or of Dekker.

BUFFOON (Fr. *bouffon*, It. *buffone*, from *buffa*, jest, *buffare*, to puff, buff, blow). A low jester. The Italian *buffo* (from *buffa*, a farce) is the name given to a comic singer in an opera. In the corrupt Latinity of the Middle Ages *buffa* meant a slap on the cheek; and in the Italian *buffare* signifies the puffing of wind through the mouth. It is probably from the favorite trick played by clowns in farces—one swelling out his cheeks with wind, the other slapping them, so as to make a ludicrous explosion—that the terms *buffones* in Latin, *buffoni* in Italian, *bouffons* in French, and in English *buffoon*, were derived. In Italy, the *buffo cantante* is distinct from the *buffo comico;* the former having greater musical talent, and sustaining a more important part, the latter having greater license in jocoseness. The voice of a *buffo cantante* is generally a bass, but sometimes a tenor buffo is introduced.

BU'FORD, JOHN (1826-63). An American soldier, prominent as a cavalry leader on the Federal side in the Civil War. He was born in Woodford County, Ky., graduated at West Point in 1848; was assigned to garrison duty in the West; participated, as first lieutenant, in the Sioux expedition of 1855, and in the Utah expedition of 1857-58; and from 1859 to 1861 was stationed at Fort Crittendon, Utah. In November, 1861, he was appointed assistant inspector-general with the rank of major, and in July, 1862, after having served for several months in the defenses at Washington, was raised to the rank of brigadier-general of volunteers. He was then placed in command of a cavalry brigade in the Army of Virginia, took a prominent part in General Hooker's campaign of 1862, and was wounded in the second battle of Bull Run. In McClellan's Maryland campaign, he served as chief of cavalry in the Army of the Potomac, and took a prominent part in the battles of South Mountain and Antietam, replacing Stoneman on McClellan's staff after the latter. Soon afterwards, upon the reorganization of the cavalry by Burnside, Buford was placed in command of the Reserve Cavalry Brigade, and in this capacity took part in the battle of Fredericksburg, in the famous Stoneman's Raid, and in the spirited cavalry engagements at Brandy Station. He then served under Meade in the Pennsylvania campaign, was engaged in numerous cavalry skirmishes, and displayed remarkable gallantry in the battle of Gettysburg, which he began, before the arrival of Reynolds, on July 1. By many he is credited with having deliberately chosen the field on which this great battle was fought, and with having so manœuvred as to bring Meade and Lee together here. Thus the Comte de Paris says, "It was Buford who selected the battlefield where the two armies were about to measure their strength" (*History of the Civil War in America*, III., 545). Buford pursued the Confederates to Warrenton, and was afterwards engaged in many operations in Central Virginia, rendering a particularly valuable service in covering Meade's retrograde movement to Bull Run in October, 1863. He withdrew on sick leave in November, and on December 16 died in Washington, receiving a commission as major-general on the day of his death. A monument was erected to his memory on the Gettysburg battlefield in 1895. Consult a biographical sketch in the *Proceedings of the Buford Memorial Association* (New York, 1895).

BUFORD, NAPOLEON BONAPARTE (1807-83). An American soldier and clergyman. He was born in Kentucky, and graduated at West Point in 1827. He then studied law at Harvard, was assistant professor at West Point, and in 1835 resigned from the service to become an engineer.

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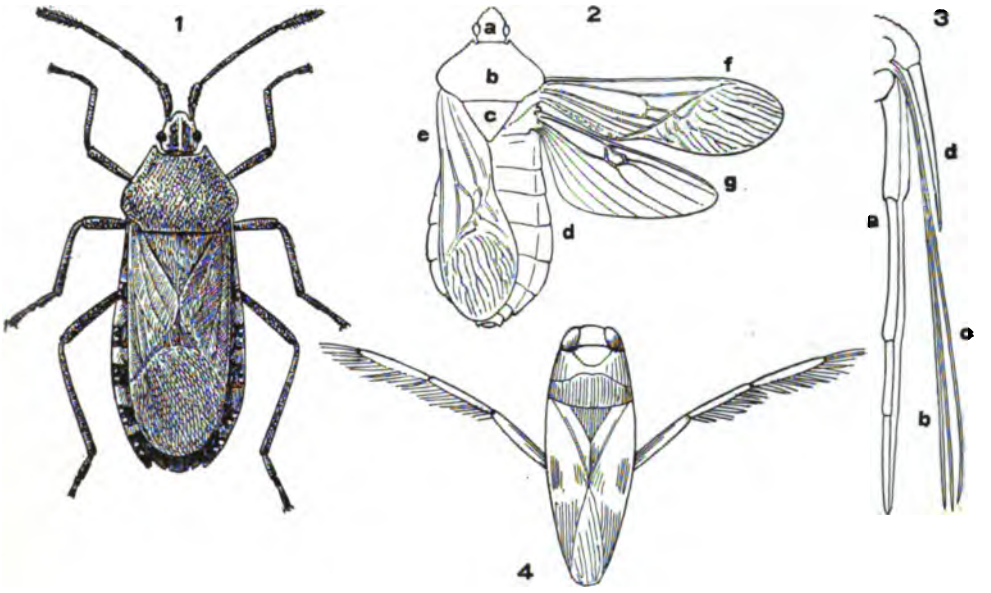
He afterwards engaged in iron-manufacturing and banking at Peoria, Ill., and became president of the Rock Island and Peoria Railroad. In the Civil War he was first a colonel of volunteers and then a brigadier-general, took part in the sieges of Corinth and Vicksburg, and in 1865 was brevetted major-general of volunteers. General Buford was Government inspector of the Union Pacific Railroad from 1867 to 1869 and a special commissioner of Indian affairs in 1867-68.

BUG, bōōg. Two rivers of Russia. The first, a tributary of the Vistula, rises in Galicia, Austria-Hungary, and entering Russia, flows at first north, along the eastern borders of Poland, and then west, and joins the Vistula at the fortress of Novogeorgieosk, after a course of over 450 miles (Map: Russia, B 4). It is navigable for over 300 miles, and is of great importance to the lumber trade of Russia. It is connected by canals with the Dnieper and the Niemen. The second river, the ancient *Hypanis*, or *Bogus*, whence the name, rises in the southern part of Volhynia, and flows in a southeastern direction through the governments of Podolia and Kherson, emptying into the Black Sea near Nikolayev, where it forms a wide estuary connected with the Dnieper Liman (Map: Russia, D 5). Its total length is about 500 miles, and it is navigable for small craft as far as Voznesensk, while larger steamers can ascend only to Nicolaiev. Its chief tributary is the Ingul.

BUG (Welsh *bwg*, spectre, Corn. *bucca*, bugbear; cf. Lith. *baugus*, terrific). The common name applied to the various members of the order Hemiptera (Gk. ἡμι, *hēmi*, half + πτερόν, *pteron*, wing), so named because the basal half of the wing in many of the forms is thickened like the wing-covers of beetles, while the distal half is membranous and wing-like. The mouth parts are in the form of a beak, and are fitted for piercing and sucking. Nearly all bugs subsist on the juices of plants, a few partake of animal juices alone, and several of both animal and vegetable fluids; hence, economically, the order is very injurious. A few forms are predaceous and hence helpful. Certain others, such as the cochineal and lac-dye insects, and their secretions, such as china-wax and shellac, are articles of considerable commercial importance. Many bugs secrete a substance characteristically pungent, penetrating, and often having disagreeable smell and taste. The metamorphosis of bugs is incomplete—i.e. they do not transform completely at once; and the parasitic forms are wingless. Some of the species are very large, certain aquatic ones reaching a length of 12 centimeters. A loathsome, long-known, and widespread pest of man is the bedbug (q.v.). In Chile a very large bug hides in the thatch of houses, and, like the bedbug, comes out at night to suck blood. In England there is found on the birch-tree a bug that has the rare habit among insects of caring for its young. Among all the bugs injurious to agriculture, the chinch-bug (q.v.) (*Blissus leucopterus*) ranks first in the United States; and it is in the Mississippi Valley that it does the most harm, destroying entire crops of wheat, oats, and Indian corn, especially during dry, warm summers.



TYPICAL BUGS AND STRUCTURE.

1. Adult Squash-Bug (*Anasa armigera*). 2. Principal Features of a Typical Bug: *a*, head; *b*, prothorax; *c*, scutellum of mesothorax; *d*, segments of abdomen; *e*, left wings folded over the back (position of rest); *f*, *g*, right wings extended (as in flight). 3. Mouth-Parts of the Squash-Bug: *a*, labium; *b*, maxillæ, so close together as to appear as one; *c*, mandibles; *d*, upper lip. 4. An Aquatic Bug (Notonecta), showing third pair of feet modified into oars.

The squash-bugs (q.v.) destroy squash and pumpkin vines. Other bugs feed on cabbage, radishes, and turnips. The true lice, both of man and beast, are bugs; so also are the cicadas, which include the seventeen-year locust. Certain plant-sucking bugs cover themselves in their immature stages with a mass of foam, which is commonly known as 'frog-spittle.' To the bugs belong the aphids, plant-lice which prey on the root, stem, or leaf of all sorts of plants. Closely related to the latter are the scaly bugs

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so common on the oleander, lemon, and orange. Indeed, were it not for the many insect and larger foes of bugs, as well as for the fungus and other diseases they are subjected to, vegetation could not possibly exist. Consult, for further particulars, the special articles under the names above mentioned.

BUGASON, bōō'gà-sōn'. A town of Panay, Philippines, in the Province of Antique. It is situated on the coast, 24 miles north of San José de Buenavista. Bugason was founded in 1700. Population, in 1898, 14,104.

BUGBANE. See CIMICIFUGA.

BUGEAUD DE LA PICONNERIE, bụ'zhô' de là pê'kôn'rê', THOMAS ROBERT, Duc d'Isly (1784-1849). A French marshal. He was born in Limoges, Department of Haute-Vienne, France, and in his twentieth year entered the army as a private. His conspicuous bravery in the Prussian, Polish, and Spanish campaigns gained him rapid promotion. Shortly before the fall of Napoleon Bugeaud was made a colonel, and in 1815 commanded the advance-guard of the army corps of the Alps. He afterwards retired to his estates, but was called into public life by the July Revolution of 1830. He was elected deputy for Périgueux in 1831, and gained the esteem of Louis Philippe. In 1834 he put down an insurrection in the streets of Paris. The next year he voted against electoral reforms and universal suffrage, denounced the 'tyranny of the press,' and soon contrived to make himself very unpopular. In 1840 he was appointed Governor-General of Algeria. He immediately set about organizing the celebrated irregular force known as the Zouaves, and in a few years the French arms were everywhere triumphant over the Arab tribes. The cruelty of some of Bugeaud's proceedings excited strong feelings of reprobation at the time in France and in Europe generally. In 1844 he gained a victory over the Emperor of Morocco's forces at Isly, for which he was created a marshal of France and received the title of Duc d'Isly. At the outbreak of the Revolution of February, 1848, Marshal Bugeaud received the command of the army in Paris, but, having counseled the strictest measures in order to quell the outbreak, he was dismissed by the frightened King the following day (February 24). When Louis Napoleon became President he intrusted the chief command of the Army of the Alps to Bugeaud, but he soon after died of the cholera in Paris. He left behind him his *Mémoires*, which were translated into English in 1882.

BUGENHAGEN, bōō'gen-hä'gen, JOHANN, surnamed POMERANUS, or Dr. POMMER (1485-1558). A German reformer. He was born at Wollin, near Stettin, in Pomerania, June 24, 1485. He studied at Greifswald, and as early as 1504 became rector of the academy at Treptow; became a priest in 1509, but did not give up his school, which greatly prospered under him. There he lived quietly, fulfilling the duties of his office until 1520, when his religious views were changed by reading Luther's little book *De Captivitate Babylonica*. Bugenhagen was now seized, as it were, by the zealous spirit of the Reformation, and to avoid the persecutions of the Old Church Party, he betook himself to Wittenberg, where he matriculated (1521), and where his talents procured for him in succession several high positions. Bugenhagen's remarkable philological and exegetical powers were of great service to Luther in his translation of the Bible. In 1525 he opened the controversy between Luther and Zwingli by a treatise against the latter, to which Zwingli ably replied. He possessed a remarkable talent for organization, establishing churches in Brunswick, Hamburg, Lübeck, and in Pomerania. In 1537 he was called to Denmark by Christian III. to reform the ecclesiastical establishment of that country. He accomplished this so admirably that the Danes to this day consider him their own reformer. In 1542 he returned to Wittenberg, and continued his energetic efforts to extend the new theology throughout his native land. He died there, April 20, 1558. His best work is his *Interpretatio in Librum Psalmorum* (1523), but his works have not been collected. Letters of his were published by O. Vogt in Stettin, 1888; additional ones in 1890; but many still exist unprinted. For his life, consult: C. A. T. Vogt (Elberfeld, 1867), with selections from his writings; and H. Hering (Halle, 1888).

BUGGE, bụg'ge, ELSEUS SOPHUS (1833—). A Norwegian philologist. He was born at Laurvig, and was educated at the universities of Christiania, Copenhagen, and Berlin. In 1866 he became the first professor of comparative philology and of the Old Norse language at Christiania, a chair which was founded by the Storthing. His principal work is an edition of the songs of the Edda, which he published under the title *Norroen Fornkvædi* (1867), and which has supplanted all previous editions. Bugge is the leading authority on Northern languages. Some of his works on this and kindred subjects are: *Gamle norske Folkeviser* (1858); *Norroene Skrifter of sagnhistorisk Indhold* (1864-73); a splendid edition of the *Völsunga* and *Hervarar* sagas; and *Tolkning af Runeindskriften paa Rökstenen i Oestergötland* (in *Antiqvarisk Tidskrift för Svorige*, Vol. V.).

BUGIS, bōō'jēz. The natives of the country of Boni, in the southwestern Celebes, whose State once held sway over a large portion of the island. They belong physically to the lighter and more attractive Malay type, and their language is closely related to that of their neighbors, the Macassars; but they have an alphabet and a literature of their own. They profess the religion of Islam. The Bugis are much devoted to the arts of peace, and as traders and seamen they are found all over the archipelago, from Malacca to New Guinea. In Perak, Borneo, etc., their colonies are quite numerous and large. Their governmental institutions seem to have been more liberal and their folk-life more advanced than those of the other peoples of Celebes. Socially and morally they rank with the best of the Malays, and have a reputation for honesty, in spite of the unprepossessing looks of many of the sailor sort. Of recent literature may be mentioned P. B. van Staden ten Brink, *Zuid Celebes* (1884). See CELEBES.

BUGIARDINI, bōō'jär-dē'nê, GIULIANO (1475-1554). An Italian painter, known as Julianus Florentinus, born in Florence. He was a pupil of Mariotto Albertinelli and Dominico Ghirlandajo, and was the assistant and

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lifelong friend of Michelangelo. His favorite theme is the Madonna, whom he frequently portrays in association with the youthful Saint John. The following are a few of his principal works: "Birth of Christ" (Sacristy of Santa Croce); "Weeping Madonna" (Uffizi Gallery, Florence); "Madonna and Saint John the Baptist" (Leipzig Museum); "Nativity" (Berlin Museum); "Marriage of Saint Catharine" (Bologna Gallery).

BUG-JARGAL, bu'zhär'gàl'. The chief character—a negro prince who loves a white woman—in the novel of the same name by Victor Hugo. The first sketch of *Bug-Jargal* appeared in the *Conservateur littéraire,* founded in 1819 by Hugo and his brothers.

BUGLE, bū'g'l (Fr., from Late Lat. *bugillo,* a plant). *Ajuga,* a genus of hardy herbaceous plants of the order Labiatæ, having an irregular corolla, with very short upper lip and trifid lower lip and protruding stamens. The species are mostly natives of the colder parts of the Old World, and several are British. The common bugle (*Ajuga reptans*) is abundant in moist pastures and woods. Its flowers are generally blue, but varieties occur with white and purplish flowers, which are often introduced into flower borders. The Alpine form is one of the beautiful flowers of the Swiss Alps.

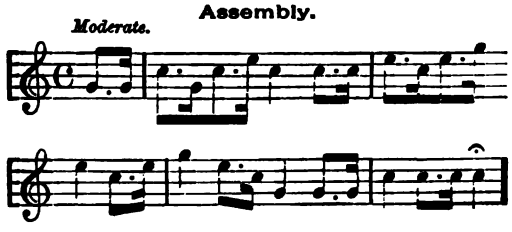
BUGLE (origin obscure). A musical wind instrument of brass or copper, used mostly as a signal instrument in military evolutions. The bugle is made in three pitches, B♭, C, E♭, and has seven harmonic tones. Between 1815 and 1835 its power and range were increased by the additions of sound-holes and keys; and, upon the introduction of valves, from the bugle were formed the tuba (q.v.) and saxhorn (q.v.). See BAND; WIND INSTRUMENTS.

BUGLE and TRUMPET CALLS. Military signals sounded by trumpet or bugle to notify troops of an order to be executed. The use of trumpets, as all earlier forms of bugles and trumpets were called, dates from the very earliest times, and the primary purpose of the historic ram's-horn and the modern bugle were practically identical. Changes in military conditions and tactics have only served to invest the bugle with increased importance. Indeed, the scattered disposition of troops in modern battle formations, the necessity for extended intervals in even the smallest command, together with the practical hiding of many of the details under cover, make the modern bugler or trumpeter more necessarily the mouthpiece of the officer to-day than at any previous period of military history. The bugle possesses an added importance in the moral support and strenuous encouragement which results from its strident tones. In times of peace the uses of the bugle are far more manifold and scarcely less important. From the sounding of reveille, that summons the troops from slumber, to the last note of taps, the routine life of the army post is punctuated by the notes of the bugle or trumpet calling the men to their various duties, drills, and parades. In the United States Army the chief trumpeter ranks next above battalion or squadron sergeant-majors, while in England he is described as bugle or trumpet major, and ranks as next junior to the color-sergeants in infantry, or troop sergeant-majors in cavalry—an equivalent rank to first sergeant in the United States Army. Another custom, as universal as the use of the bugle, is to furnish officers and a proportion of non-commissioned officers with whistles, by which means orders can be given and men controlled on occasions when a trumpet would be unwise or impossible. In the United States Army the quartermaster's department is ordered to supply to each field battery two small brass B♭ bugles, and to every other company two G trumpets with F slides or detachable F crooks.

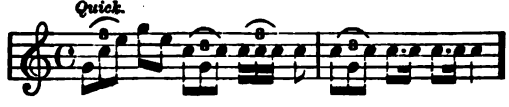
Bugle or trumpet calls may be grouped under four general headings, as: warning calls, formation calls, alarm calls, and service calls. The 'calls' that follow are taken from the *Infantry Drill Regulations,* United States Army. A prominent feature of this code is the excellent manner of arrangement, by which the memorizing of the calls is much facilitated. For instance, all movements to the right are on the ascending chord; the corresponding movements to the left are corresponding signals on the descending chord; and the changes of gait all upon the same note.

The music here reproduced is written an octave higher than the trumpet scale, and is adjusted to the scale of the bugle.

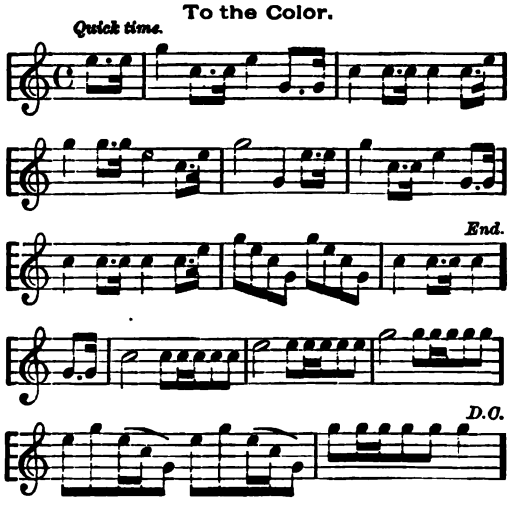
Assembly.



Boots and Saddles.



To the Color.



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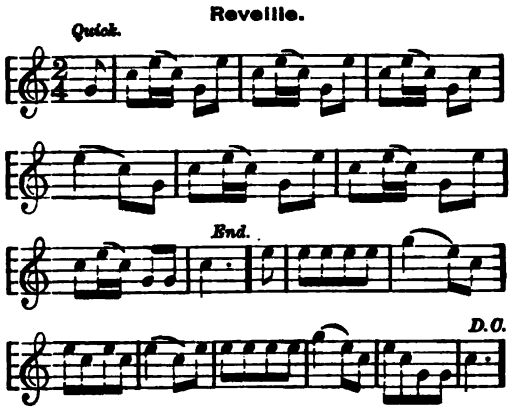

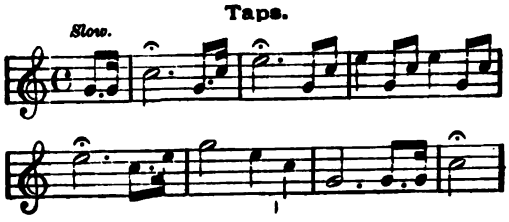

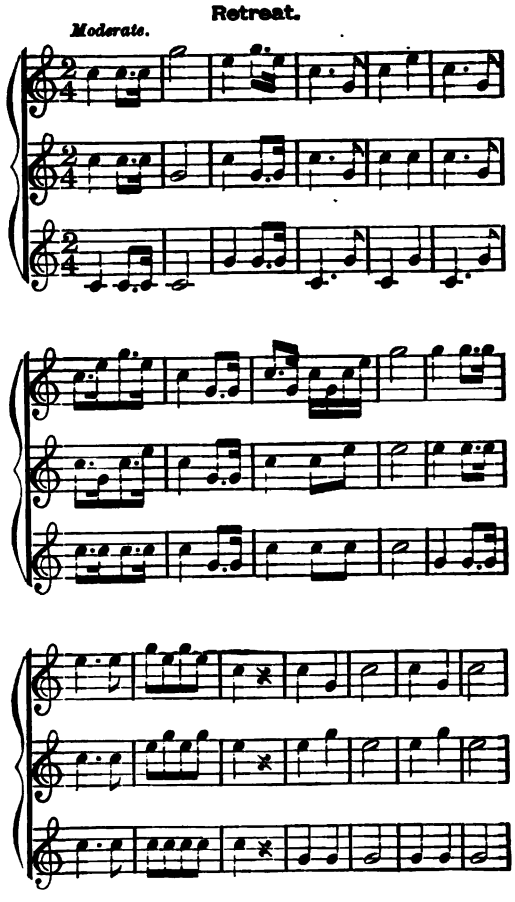

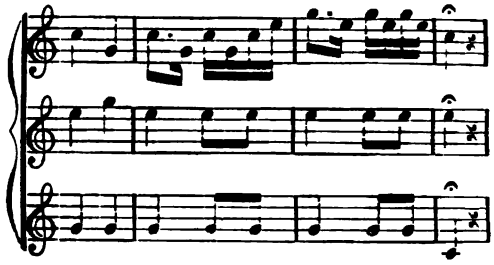

For further information, consult Littleton, *Trumpeter's Hand-book and Instructor* (Kansas City, 1902).

BU'GLOSS (Fr. *buglosse*, Lat. *buglossa*, from Gk. *βοῦς*, *bous*, ox + *γλῶσσα*, *glōssa*, tongue). A name popularly applied to many plants of the order Boraginaceæ, as to the species of Anchusa or alkanet (q.v.), etc. In some botanical works the name is confined to the genus Lycopsis, which differs from Anchusa in the curiously curved tube of the corolla, and of which one species (*Lycopsis arvensis*) is a common weed in grain fields in Great Britain. The beautiful genus Echium is called viper's bugloss. For illustration, see BRAZILNUT Plate.

BU'GONG. A food prepared by the native Australians from a butterfly of the genus Danais. See MILKWEED BUTTERFLY.

BUGURUSLAN, bōō'gōō-rōō-slän'. A district town of the Russian Government of Samara, situated on the river Kinel, 178 miles northeast of Samara (Map: Russia, H 4). It contains a monastery, and the chief occupations of its inhabitants are farming and gardening. There is some trade in local products. Population, in 1897, 12,141, including about 1200 Mohammedans. The town was founded in 1748.

BU'HACH. See FLEABANE.

BUHI, bōō-ē'. A town of Luzon, Philippines, in the southern part of the Province of the Camarines. It is situated on the bank of Lake Buhi, 34 miles southeast of Nueva Cáceres. Population, in 1898, about 10,000.

BUHL, bōōl, LUDWIG VON (1816-80). A German physiologist, born in Munich. He did much work in physical diagnosis, pathological anatomy, and microscopy. In 1850 he became professor of general pathology and pathological anatomy at the University of Munich, and in 1875 was appointed director in the pathological institute in that city. His most important publication is the treatise on pulmonary diseases entitled *Lungenentzündung, Tuberkulose und Schwindsucht* (1872; 2d ed. 1874).

BÜHLER, bü'lēr, HANS DER, or HANS VON BÜHEL. A mediæval German poet of the Fifteenth Century. He was born in Alsace, and at the beginning of the Fifteenth Century was in the service of Frederick III. of Saarwerden, Archbishop of Cologne. His two principal poetic productions, both of which are based upon popular romances, are respectively entitled *Die Königstochter von Frankreich* (1400) and *Diocletians Leben* (1412), published by Keller (1841).

BÜHLER, JOHANN GEORG (1837-96). A German-British Sanskrit scholar and Indologist, born at Borsted, in the kingdom of Hanover,

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July 19, 1837. He studied in Göttingen, Paris, and London, and in 1863 he was appointed professor of Oriental languages at Elphinstone College, Bombay. During the years of his stay in India he took an active part in the work of the department of public instruction in the Bombay Presidency. His untiring zeal at the same time in searching for manuscripts and gathering material in Gujerat, Rajputana, Kashmir, and in Central India, yielded rich fruits for the history of ancient Hindu literature. With his colleague, Kielhorn, of the Dekhan College, Poona, he founded the valuable *Bombay Sanskrit Series* in 1868, and he collaborated with Sir Raymond West in a *Digest of Hindu Law* (1867-84). Other publications on the Indian law-books appeared from his pen in Max Müller's series of *Sacred Books of the East* (Oxford, 1879-86). In 1880 Bühler returned from India to take the chair of Sanskrit and Indology at the University of Vienna. He joined with his colleagues of the Vienna Oriental Institute in establishing the *Wiener Zeitschrift für die Kunde des Morgenlandes* (1887 et seq.). Still more important was his founding the *Grundriss der indo-arischen Philologie und Alterthumskunde* (Strassburg, 1896 et seq.), upon which he was still engaged at the time of his sudden death by drowning in Lake Constance, April, 1896. The editorial work upon this monumental publication has since been carried on by Kielhorn. Bühler's name was authoritative in almost every branch of Indian philology, archæology, and religion; but perhaps most important are his contributions on Indian epigraphy. Consult: *Epigraphia Indica* (Calcutta, 1888 et seq.); *Indian Antiquary* (Bombay, 1872 et seq.); and the *Grundriss*, or *Encyclopædia of Indo-Aryan Research.*

BUHL'WORK. See BOULLE, ANDRÉ CHARLES.

BUHRSTONE, bēr'stōn', or **BURRSTONE** (*bur* + *stone*, referring to its *bur* or rough surface). A siliceous rock, containing many small empty cells, which represent the casts of fossils. The quartz of which the rock is composed represents an amorphous form of silica that has been deposited either chemically from solution, or through the action of certain low forms of organisms. Buhrstone is used for making millstones, the presence of the pores preventing its wearing smooth. It is found chiefly in the Eocene period of the Tertiary, in France, Belgium, Wales, Scotland, and Alabama. The French buhrstone commands the highest price and is exported to the United States. There are different varieties of buhrstone, which vary in respect of the size, frequency, and manner of distribution of the cells. It is not unusual to form millstones of wedge-shaped pieces of buhrstone bound together by iron hoops. The stone is found in beds or in detached masses, and the mode of quarrying is peculiar. When the mass is large, it is cut into the form of a huge cylinder; around this grooves are cut, at distances of about eighteen inches, the intended thickness of the millstones; into these grooves wooden wedges are driven and water is thrown upon the wedges, causing the wood to swell and thus to split the cylinder into the required sections.

The term buhrstone is sometimes erroneously applied to millstones made of sandstone or conglomerate. The German buhrstone is a variety of cellular basalt. See GRINDSTONES; ABRASIVES; TERTIARY.

BUHUANO, bōō-hwä'nō, or **BUJUANO.** A head-hunting tribe in Isabela de Luzon Province, Luzon. See PHILIPPINES.

BUIL, bwēl, BERNARDO. See BOIL, BERNARDO.

BUILDING (AS. *byldan*, to build, *bold*, Icel. *bōl*, house, from Icel. *bua*, to live, abide, dwell; cf. OHG. *būan*, Goth. *bauan*, to dwell, inhabit, Ger. *bauen*, to build, Skt. *bhū*, to be). A term used in two senses, applying either to the art or trade of erecting structures, or to a structure itself. Building should properly be distinguished from both architecture and construction. All architecture is building with something added; all building is not architecture, because it may not have any artistic qualities. Then again, all construction is building with something added; but all building is not construction, because it may lack in scientific qualities. Still, loosely speaking, building as a more general term is made to include both the others, especially as in modern usage a builder is one who has general supervision over the several distinct arts and trades concerned in making a building complete in every part, in which case he is also called the contractor. At the head of the building trade is the architect, who is employed to draw plans, and to make drawings and specifications for the work to be done. At present the architect and the building contractor are always two distinct persons, with divergent interests; but it was not always so, and it will be interesting to examine into the history of building before studying present conditions. The technical side of building is discussed under separate articles: BRICK; STONEWORK; MASONRY; FIREPROOF CONSTRUCTION; and CARPENTRY cover all the main divisions of materials, with such side articles as CONCRETE and VAULTING. The historic developments are given under the general history of ARCHITECTURE; the scientific issues under CONSTRUCTION; so that what remains to be explained is really the personality, duties, and relations of builders, contractors, and architects, which are not elsewhere touched upon.

Building has been in the past carried on according to three methods: (1) by forced, or otherwise unpaid labor and contributions; (2) by paid day's work; (3) by contract. The last mentioned is the common modern method, and accounts for the defective and inartistic quality, especially in details, of most present work; but it is only gradually that contract work gained its present supremacy. The first method, by unpaid labor, was common in despotic communities like Egypt and Assyria; the forced labor of the Israelites in Egypt was matched in the same country down to the present century, and is still found in Turkey. Of course, this meant a mass of untrained laborers with only a few skilled men in charge, and involved imperfection of detail. As a system it was beautifully organized by the Roman Empire, which was able to cover the world with superb buildings at small cash expenditure. In the first place, all the materials were furnished free as part of tribute or tax by different provinces or cities, and were transported free by vessels or carts in return for trade privileges; in the second place, the Roman Army was turned into an immense building organization, with engineers, stone and brick ma-

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sons, and carpenters attached to each legion. Not only were bridges and aqueducts built by them, but entire cities, without pay. Finally, all arts and trades were separately organized with a membership known to and controlled by the State, and were corporately bound to furnish free labor to the State in return for monopoly in each occupation, which no one not belonging to the association could practice. This obligation became finally so heavy a burden to the corporations as to lead to their decay. All this explains both the immense quantity and the lack of individuality in Roman work.

Free labor, however, was not always forced. Mediæval building shows this. It was at first, during the Monastic Age (Eighth to Eleventh centuries), a modification of the Roman, with this difference, that in its artistic branches it is a labor of love. The monasteries taught all the arts and trades, and were, in fact, the only schools for them: the institutes of technology and of art. The masses of workmen so developed were of two classes; either members of the monastery—full monks, lay brothers, and novices; or they were laymen who were the property or dependents of the monastery, organized by trades, living in its shadow and obliged to give their work free. Neither class worked for pay—the one did it for love, the other for duty. Therefore, while knowledge was less than in the Roman period, intention was better, and love is shown in the details which were usually the work of the members of the monastery. When the monopoly of art passed from the monasteries in the Eleventh Century, the organization of free lay associations of arts and trades put an end to this condition. Only sporadically do we henceforth find free labor and free material playing any large part in building, in such cases as when a whole community threw itself, under the religious enthusiasm of the Crusading Age, into the erection of some great cathedral.

As for the second method, building by paid day's work, we know very little about it until the historic age in Greece, when we find it the prevailing method. The State engaged directly each workman, whether slave or free, and paid him individually, and appointed officials to oversee the work. There were a business committee and technical overseers, the latter including an architect and a clerk of the works. The State supplied all materials by dealing directly with individuals, for transportation, quarrying, etc. The reports of these overseers and committees, the accounts rendered with itemized details, are extant in a number of cases, even for such important buildings as the Erechtheum and Propylæa at Athens, the temples of Eleusis and the Parthenon. The perfection of Greek work of the Golden Age in all its details is partly accounted for by the individual responsibility thus placed upon each workman. The Greeks never entirely gave up the direct engagement of workmen by day's work or job work in monuments of the first class, especially temples, nor did they ever leave the quantity of the materials to be used at the mercy of the contractor, even in contract work, but saw that they were supplied by the State. The contract method first obtained a foothold in Greece in works that belonged to engineering rather than architecture; in the erection of city walls, like those of Athens, of arsenals, like that of the Piræus; in the draining of lakes, etc. Then, in the Fourth Century B.C., this method invaded the finer branches of building, but even then no one contractor was given the entire work; it was portioned among a multitude of small contractors, and a considerable part of the work was kept out of the contractors' hands altogether, being under the direct supervision of the State architect.

The Romans never appear to have used such free and individual labor. Livy's references show that in Republican times the State, represented by the Censors, had public structures put up for a lump sum by a single contractor. With the Greeks the contractor and the architect had rarely been the same man; but contractors and builders were identical. Among the Romans the same man was often both architect and contractor, as well as builder, except in cases where contracting was indulged in without technical knowledge as a mere speculation, which led to many abuses, as in the famous case of Verres. Contract work thus shared forced labor with the Romans. Organized, not individual, labor was their watchword, but not *free* organization. This was carried to an extreme by the Byzantine State, which governed the arts and trades with an iron hand. The individual responsibility of workmen and the system of days' work was not revived until, after an interval of over a thousand years, the organization of the lay artists and artisans of Italy in the Eleventh, Twelfth, and Thirteenth centuries, which spread gradually to the rest of Europe, and is accountable for the return of artistic quality in the details of architecture of the late Romanesque, Gothic, and Renaissance periods. Membership in the guilds, which represented the culmination of this organized labor, besides conferring freedom to work, entailed obligations of good work, and if work was defective, expulsion followed. The labor associations of those days, different from our own, gave more thought to the quality of their work and the development of their art than to the assertion of claims. Architects, sculptors, and painters, even those of the highest merit, belonged to these guilds. The architects of this period usually possessed what those of Greece had possessed, a general and even practical knowledge of the principal related arts of architectural decoration, design, sculpture, and sometimes even of painting. Even more than in the Golden Age of Greece, all work was done by the employer dealing directly with individual workmen, either by day's work, or what is its practical equivalent, job work. The head architect was engaged in the same way, and he was thus the head builder, but not the contractor. It is interesting to note how, as was the case in Greece, contract work crept in with the decay of the Renaissance, though it did not become general until the last century.

At present the architect and the builder are more clearly in separate spheres than ever before, though each must, in his way, keep in touch with all the arts and trades that are required to make a building complete. The differentiation of these occupations has steadily increased, as well as their efficiency in practical ways. The architect and builder must keep informed of all such changes. They must also know about the State and city legislation affecting building, frontage, projections, stoops, drainage, use, strength and quality of material, context and

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registration of contracts, etc. Each country, each large city is likely to vary in such regulations. Another necessary preliminary is a knowledge of the locality, especially the subsoil, lay of the land, transport facilities, etc., as this affects the placing and price of the building. The first step toward a building on the part of the employer is the selection of an architect. In the case of large public or corporate undertakings, this is often left to competitive examination, open to all comers, but ordinarily an architect is chosen outright and asked to submit a preliminary sketch. If approved, this is followed by a set of specifications covering every detail of construction and finish; size, kind, and quality of materials; and description of its *mise en œuvre*. In making this the architect has due regard to the amount the client wishes to spend. Then a list of contractors is made out to whom the architect sends copies of these specifications, and they send in their bids. The lowest responsible bidder is usually chosen. A contract is then drawn up, usually a modification of a printed formula supplied by the architect. It is made to include the specifications, mentions a date for the completion of the work, often with a money penalty for delay, and often stipulating that the contractor should furnish a bond, and that the payment should be made in installments, at certain periods of the work's progress, on the architect's certificate. As one of the great troubles has been the desire of employers to make changes in the course of the work, there is usually some clause regulating how this shall be done so as to avoid dispute. The site is then surveyed and work begun. Great power of decision is given the architect, who either visits the building himself periodically or appoints a clerk of the works to exercise constant supervision to insure the exact carrying out of the contract. The usual architect's fee is 5 per cent. of the cost of the completed building, but much less if he exercises no supervision. His greatest work is the preparation of the detailed working plans and drawings, with which he must supply the contractor in advance of the work. As for the contractor or master-mechanic, it is customary to employ a single general contractor (though the heating apparatus is often done by separate contract) who is virtually the constructor and manager, and sub-lets to others certain special parts of the work, such as excavating, masonry, ironwork, plumbing, inside woodwork, painting, etc., making contracts with these mechanics, and becoming responsible for their work, or else, as in England, he himself employs these different classes of mechanics. These sub-contractors, and even individual workmen, if unpaid, can, in certain countries, get out mechanics' liens on the building—a sort of first mortgage. The final payment is not made until the work has been approved by the local inspectors (e.g. plumbing) and accepted by the architect. Modern methods of turning out all classes of material mechanically in great quantities at scheduled prices facilitates estimates and makes quick work easier, but leads to a dead level of uniformity. Modern architects have advanced in the quality of their designs far more rapidly than our mechanics and manufacturers have in the artistic or even careful treatment of details.

To carry the designs of an architect into effect many mechanical operations are necessary, to all of which collectively the term building is applied. The principal materials used in building are stone, burnt-clay products, cement and lime mixtures, wood, glass, and metal. In addition must be considered secondary building materials, among which are included a variety of mineral, vegetable, and animal products, of which paint, varnish, papier-maché, cloth, and leather are familiar examples. Building operations in their broadest sense include all the operations necessary to shape these materials into suitable structural forms, and to combine these forms into a finished structure or building. Nowadays, however, the shaping of building material into structural forms suitable for building purposes is done wholly or in great part in factories and workshops, thus leaving only their erection and some small part of their shaping to be accomplished on the site of the structure being built. Building operations in their narrowest sense, therefore, include only the erecting and shaping operations actually carried on at the site of the building. To illustrate, the cutting and dressing of stone; the molding and burning of brick and tile; the rough-sawing and dressing of timber into beams, boards, clapboards, lath, and shingles; the turning of wooden balusters and pillars, the making and glazing of window-sash, the making of doors, mantels, moldings, newel-posts, railings, etc.; the rolling and framing of steel girders and columns; the forging and founding of grill-work, screws, nails, hinges, and builders' hardware generally, are to-day carried on in factories and workshops, and are essentially manufacturing processes. On the other hand, the laying up of stone and brick into walls, columns, and arches; the framing of timber into beams, joists, and rafters, erecting them and covering them with sheathing, clapboards, and shingles; the erection and fire-proofing of steel beams and columns; the setting in place of doors and windows, are of course all done on the site of the building, and are essentially building processes.

These building processes alone, as distinguished from the manufacturing processes indicated above, and as applied to the construction and erection of buildings for the housing of persons and property, are considered below. The principal building processes may be enumerated as follows: Stonelaying; bricklaying; fireproofing; lathing and plastering; carpentry; glazing; plumbing; painting; and decorating.

STONELAYING is the process of laying up or joining together stone to form stonework. Stonework in buildings includes walls, piers, arches, and trimmings. Walls are generally either rubble or ashlar stonework. Rubble stonework is in general used only for foundation walls and for exterior walls—(1) when suitable stone for cutting cannot be obtained, (2) when the expense of cut stone is not warranted, and (3) when a rustic appearance is desired by the architect. In laying rubble walls (Fig. 1) the rough projections on the stones as they come in various sizes from the quarry are broken off. The stonelayer then places the stones in the wall, choosing and alternating the large and small stones so that they will fit together as compactly or with as few void spaces as possible, so that the front and back of the wall is well tied or bonded together, and so that the exposed face of the wall shall

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present the neatest possible appearance. All void spaces are packed with spalls or stone chips and flushed full of mortar. Mortar is also placed between the stones, so that they do not touch

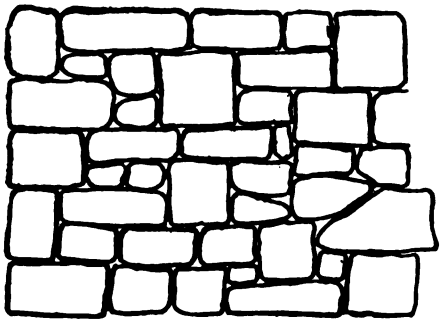

FIG. 1. RUBBLE-STONE WALL.

each other, but are held together by the hardened matrix. All rubble stonework is built substantially as described, except in some cases the face-stones have their joints dressed (Fig. 2) so that

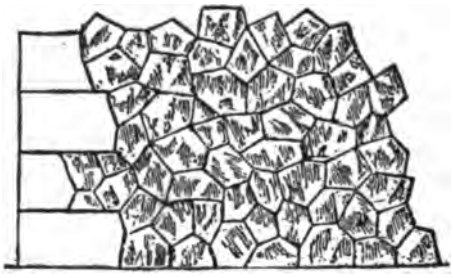

FIG. 2. RUBBLE-STONE WALL, WITH DRESSED JOINT.

when laid up the face of the wall has a mosaic-like appearance, while in other cases round field-stones or cobblestones are used for the facing. Ashlar stonework, or stonework of rectangular cut stone (Figs. 3 and 4), is used for walls in which the solidity and regularity is desired that is given only by stones cut and dressed to perfect parallelopipedons. Walls are seldom built of ashlar cut stone for their whole thickness, but are composed of an ashlar facing, backed by rubble stonework or by brickwork.

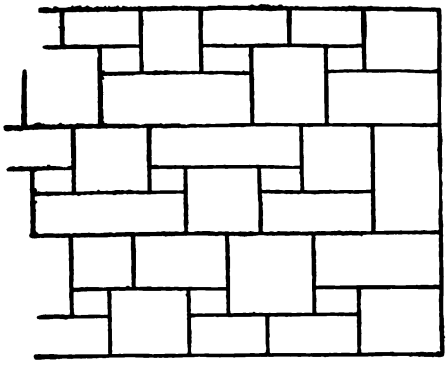

FIG. 3. RANDOM ASHLAR STONE WALL.

In laying ashlar facing, the stonelayer superimposes one stone upon another side by side, or end to end, with thin mortar joints between them, and as fast as the facing is carried up it is followed by the supporting rubble or brickwork backing. At intervals a facing-stone of unusual depth is inserted, which extends back into the backing and ties the facing to the backing. Sometimes metal ties are used in place of deeper facing-stones to insure this bonding together of the wall. The arrangement of the stones composing the ashlar facing, or, so to speak, the

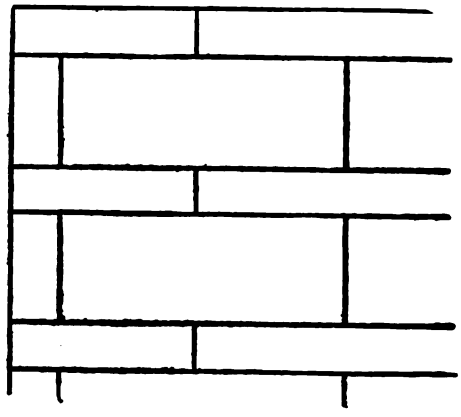

FIG. 4. COURSED ASHLAR STONE WALL.

pattern of the facing, is specified by the architect so that the stonelayer has only to follow these instructions.

After the wall, including facing and backing, has been completed, the stonelayer scrapes out and removes the mortar joints to the depth of about one inch, and fills the space thus secured with finer quality of mortar, giving it a rounded edge or beading. This work is termed pointing. After the pointing has been completed long enough for the wall to become hard, the face of the wall is cleaned or scrubbed with water and muriatic acid, which completes the work. This work is termed cleaning. *Arches* are always built of cut and dressed stones (Fig. 5), having

FIG. 5. ASHLAR STONE ARCH.

the shape of the frustum of a wedge, and called voussoirs. (See ARCH.) Rubble arches are sometimes used, but they require the selection of suitably shaped stones for voussoirs, and the use of wedge-shaped mortar joints. In cut-stone arches nearly always an odd number of voussoirs are used, so that one of them, called a keystone, comes exactly at the centre of the top of the arch.

In laying stone arches, the stonelayer first erects a centre (Fig. 6), which is a structure of wood or iron whose top surface constitutes a

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platform curved to the exact arc of the intrados of the arch. Work is then begun by laying the bottom voussoir on each side of the arch. The succeeding voussoirs are then laid, one after an-

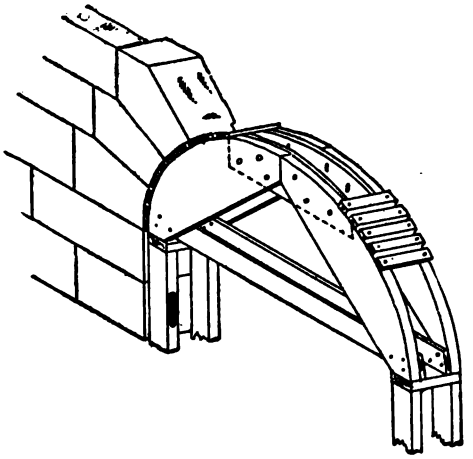

FIG. 6. CENTRE FOR CONSTRUCTING STONE ARCH.

other, working from both sides toward the top, and finally the top voussoir, or keystone, is inserted. Between the voussoirs are mortar joints. Until the keystone is inserted, the support of the centre is absolutely necessary to keep the arch from falling, and as a matter of fact it is usually left standing for some time after the keystone is in place, so that the mortar joints may harden before the strain of supporting itself is put upon the arch by removing its centre.

Arches in building are constructed in a variety of styles, flat (Fig. 7), elliptical, pointed,

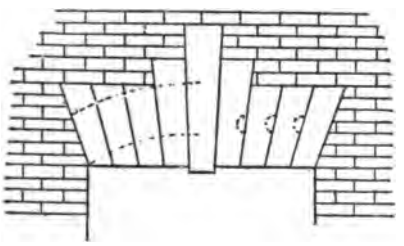

FIG. 7. FLAT ARCH OF STONE.

polycentric, etc., but all styles are laid up exactly in the way described above. *Piers* in building are column-like structures, used mostly as intermediate supports for interior columns or for girders. They are built of both rubble and cut stone, but more commonly of brick. In laying stone piers, the mode of procedure is practically the same as in laying walls. *Trimmings* in building usually denote all moldings, caps, sills, cornices, lintels, etc. Such pieces are usually cut and dressed to form and dimensions according to the architect's drawing, and are furnished to the stonelayer ready to set in place. In laying trimmings the stonelayer has, therefore, only to place them in their designated position, with suitable mortar joints, and to bind them to the adjoining walls. Arch rings and trimmings are often ornamented by stone-cutting, and frequently this work is done after they are set in place in the building. See STONE-CUTTING; SCULPTURE; MASONRY; CEMENT; FOUNDATIONS; and BUILDING-STONES.

BRICKLAYING is the process of laying up or joining together brickwork. Brickwork in building includes piers, walls, arches, vaults, chimneys, fireplaces, and various ornamental details and trimmings. No material except wood is so extensively used in building as brick. Bricks are made from clay and sand formed in molds and burned in kilns; they are produced in a great variety of shapes, sizes, colors, and styles suitable for the numerous purposes to which they are put in building construction. (See BRICK.) With the exception of arches, the process of bricklaying is practically the same for all kinds of brickwork used in building. It will be unnecessary, therefore, to consider separately walls, vaults, chimneys, etc., as enumerated above. To build any kind of a brick structure so as to make it a strong and durable piece of work, it is necessary to have a bed of some kind of mortar between the bricks. *Brickwork*, therefore, consists both of mortar and bricks. The majority of brick buildings are built with common lime mortar, to which natural cement is sometimes added. For brickwork below ground, hydraulic lime or cement mortar is used. In brickwork of common brick, the thickness of the mortar joints is from 3-16 of an inch to 3-8 of an inch, and every void in the work not occupied by other materials is filled with mortar.

The usual way to specify the thickness of joint in brickwork of common brick is by the height of eight courses of the brick measured in the wall; this height should not exceed by more than 2 inches the height of eight courses of the same brick laid dry. As common bricks are usually quite rough and uneven, it is not always easy to determine the thickness of a single joint; hence the larger unit of measure furnished by eight bricks is employed. Pressed bricks being smooth and true, enables the thickness of single joints to be specified. This is usually one-eighth inch. The methods of bricklaying for all kinds of brickwork except arches and trimmings can be illustrated by describing wall-construction. A brick wall consists of two outside courses, joined together by one or more interior courses or filling courses. The usual method of construction is to lay the outside courses first. The most approved procedure in laying an outside course of bricks is as follows: The bricklayer first spreads mortar with a trowel along a bed for the brick, and also scrapes a dab of mortar against the outer vertical angle of the last brick laid. He then presses the brick into its place with a sliding motion, which forces the mortar to fill the joints completely. Having continued the two outer courses of brick to an angle or opening, the next task is to fill the space between them or to lay the filling courses. This is done by filling the space with a thick bed of soft mortar and pressing the bricks into this mortar with a downward diagonal motion, termed 'shoving,' so as to press the mortar up into the joints. By a repetition of the process described, the wall is constructed, except that, if the face of the wall is to be plastered, the mortar projecting from the face-joints is scraped off flush with the brick; or, if the wall is to be exposed, the joints are 'struck' by holding the trowel obliquely and cut-

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ting out the joint, so that the mortar has a slant like a roof to shed water.

The face-brick are often laid in a mortar of lime paste and dry, fine sand, colored with some pigment. Frequently, also, the face-joints are pointed. The filling courses are sometimes laid dry on a bed of mortar, and the vertical joints poured full of grout or thin liquid mortar. The arrangement or 'bond' of the brick in the outside courses of walls is determined by current practice or by the specifications of the architect. There are several bonds in common use, which differ chiefly in the different arrangement of the headers and stretchers. A header in brick masonry is a brick set so that its end is exposed; a stretcher is a brick set so that its side is exposed. It will be plain that a brick laid as a header projects back into the filling, and acts as an anchor bond to bind together the outside

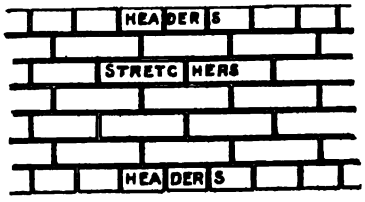

FIG. 8. BRICKWORK, COMMON BOND.

courses and the filling courses. When a course of headers is laid between every four or six courses of stretchers, the bond is known as common bond (Fig. 8). English bond (Fig. 9)

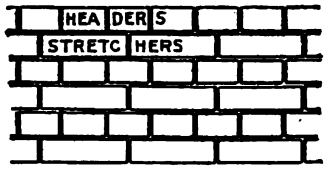

FIG. 9. BRICKWORK, ENGLISH BOND.

consists of alternate courses of headers and stretchers, and Flemish bond (Fig. 10) consists of alternate headers and stretchers in each course. There are several other varieties of bonds, but those named are the most common. Whatever the bond chosen may be, the method of laying the brick is that described above.

Brick-wall construction, however, involves

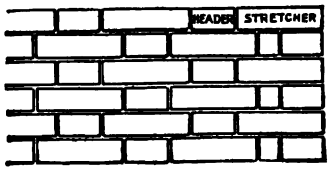

FIG. 10. BRICKWORK, FLEMISH BOND

other tasks besides the plain, solid wall-construction so far described, and some of them need to be mentioned to make clear the full extent of the work of the bricklayer. In good building practice the walls are tied or anchored to each floor at intervals of about six feet, by means of anchor-rods of various sorts, the ends of which have to be built into the wall by the bricklayer. The walls have also to be corbeled to give a bearing for the floor-joists, and the bricklayer must construct these corbels at the proper places and bond them firmly to the body of the wall.

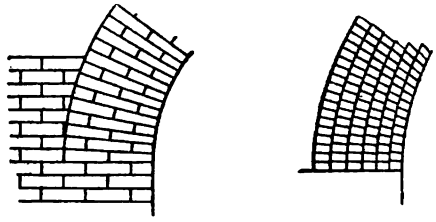

FIG. 11. TYPICAL BRICK ARCHES.

He has also to insert the relieving arches or cast-iron or steel beams over windows and door-openings, and to set the stone caps and sills, and bond them firmly to the wall. The bonding together of the outside walls at corners and of the cross or partition walls to the main walls are other items in the task of the bricklayer. In many building-walls there are introduced buttresses, panels, diaper-work, moldings, etc., of a structural or ornamental character, and these have to be executed by the bricklayer according to the plans and designs furnished him. Enough has been said to show that bricklaying is much more than the mere placing of one brick on top of another, with a mortar joint between them: it involves a very close adherence to dimensions, position, pattern, and ornament, as specified by the architect, and a knowledge of how to save time and material in securing these requirements. The mode of procedure in laying brick piers, chimneys, walls, etc., is practically the same as that in laying walls.

Arch-construction in brickwork requires more particular mention (Figs. 11 and 12). When arches are built of common brick, the bricks are laid close together on the inner edges with wedge-shaped joints of mortar, but when built of face-bricks, the bricks themselves are dressed to wedge-shaped form or to voussoirs and the mor-

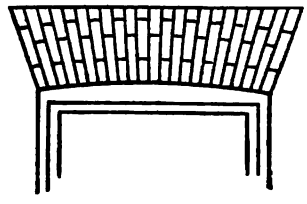

FIG. 12. FLAT BRICK ARCH.

tar joints are of uniform thickness. Arches of the construction last described are termed gauged arches. The bond of gauged arches usually corresponds to the bond of the wall in which they are set. Arches of common brick are usually built in concentric rings, with no bond but the mortar joint between them. Sometimes, however, the rings are bonded together with wedge-shaped courses extending from intrados to extrados. (See ARCH.) In laying brick arches the bricklayer makes use of a centre on which to support the arch during construction exactly as is done in laying stone arches, and as previously described. The mode of procedure is also

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the same as in stone arches, the work of setting the arch-bricks beginning at the bottom on each side, and progressing uniformly upward until the two sides meet at the crown of the arch.

FIREPROOFING is the process of laying up or applying fireproof materials to beams, columns, etc. (See FIREPROOF CONSTRUCTION.) The more common fireproof materials are burned-clay products, plaster mixtures, and concrete. Burned-clay fireproofing and fireproofing of plaster mixtures are usually furnished by the manufacturers in molded blocks ready for erection; concrete fireproofing is manufactured on the building-site, and is applied to the member to be protected in a plastic condition and afterwards hardens in place. Floor-construction and column-protection and partitions are the principal classes of fireproofing work. Tile, terra-cotta, and plastic composition blocks for fireproof floors are so made that when laid together they span the space between floor-beams and imbed the beams themselves. Floor-arches are built on centres, as are brick and masonry arches, and by practically the same mode of procedure. To illustrate, a terra-cotta floor-arch is made up of two skewback blocks which come next to the beams, and are molded so as to fit and enfold them; of a centre block or keyblock, and of several intermediate or haunch blocks. To erect such an arch the mason first suspends a centre of timber between the floor-beams. On this he sets the skewback blocks with a mortar joint between them and the beams. The haunch-blocks are then set one after another, with mortar joints, working from both ends, and last the keyblock is set. Finally the tops of the blocks are covered with a layer of concrete. Concrete floor-arches are built by suspending a suitable centre, spreading the concrete in layers and packing it firmly in position where it hardens, after which the centre is removed. Terra-cotta and plastic composition blocks for column-protection are so molded as to fit the column and are laid up with mortar joints much as brickwork is laid. Concrete fireproofing is applied to columns by placing molds around the columns and packing the annular space with concrete which hardens in position. Partition-blocks are laid up with mortar joints exactly like ashlar stonework.

LATHING AND PLASTERING are the processes of finishing walls and ceilings with lath and plaster. The very general practice of plastering walls and ceilings dates back only about a century; previous to that time walls and ceilings were either wainscoted, boarded, or covered with canvas or tapestries, or else left unfinished. Brick walls and hollow tile, plastic composition and concrete ceilings and partitions have an affinity for plaster, and it may be applied directly to them; all other constructions require some form of lathing to serve as a ground to receive and hold the plaster. Practically, all dwellings of moderate cost, and a large proportion of other buildings, are lathed with wooden lath. Wooden lath is furnished the builder in strips about one-quarter of an inch thick and 1¼ inches wide and 4 feet long.

Lathing is the process of nailing these strips parallel to each other, with one-quarter of an inch space between them to the ceiling or partition studding. In recent years the tendency toward fireproof construction has led builders and manufacturers to devise various styles of metal lathing. Coarse-mesh wire cloth, expanded metal (Fig. 13), and perforated metal (Fig. 14) are the most familiar kinds of metal lathing. These metal lathings are made in strips or sheets which are cut to the proper dimensions

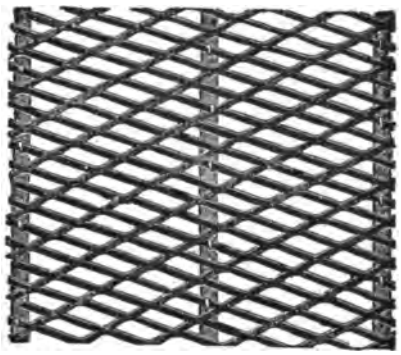

FIG. 13. EXPANDED METAL LATHING.

and applied to the ceiling-joists and partition-studding by the lather who fastens them with nails or with wire clips of some form.

The purpose of lathing, as already stated, is to form a ground to receive and hold plaster. Plasters for interior work may be divided into lime plasters and hard-wall plasters, and hard-wall plasters are susceptible of division into natural cement plasters and chemical or patented plas-

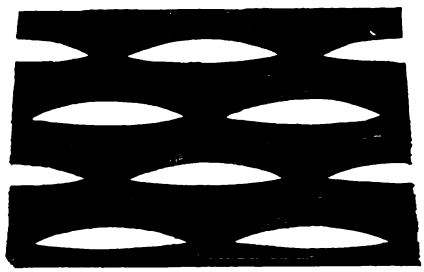

FIG. 14. PERFORATED METAL LATHING.

ters. Lime plaster is composed of quicklime, sand, and hair, or some fine fibre. For the best lime plasters the proportion of the ingredients is generally about one part lime and two parts sand, with 1½ bushels of hair to each 200 pounds of lime. The mixing of lime plaster is usually done on the building-site; but in some of the large cities there are special establishments whose business it is to mix plaster by machinery and furnish it to builders ready for use. The general mode of procedure in mixing lime plaster on the building-site is as follows: The lime is first slacked in a tight box by adding water and then the hair is added and thoroughly incorporated with the lime; lastly, the sand is added and thoroughly mixed with the lime and hair. Usually, the whole process occupies but one or two hours; but to get the very best plaster possible, the slacked lime should be allowed to stand from twenty-four hours to seven days before the hair and sand are added, and then the mixture should stand about a week; it is then

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mixed with water to the proper plasticity and immediately applied to the lathing.

Natural-cement plasters are made from certain kinds of earths found in Kansas and Texas, which assume a pulverized form when calcined, and when mixed with water will set like hydraulic lime or cement, but much more slowly, so that ample time is afforded for applying the plaster. The chemical or patented plasters commonly used are of a secret composition; but it is known in a general way that they are compounds of gypsum, to which some chemical is added, which has the effect of retarding the naturally quick setting of that material. Plastering on lathing is generally done in three coats, known as the first or scratch coat, the second or brown coat, and the third or white coat, skim coat, or finish. The scratch coat is always made rich, and contains plenty of hair or fibre, since it forms the foundation for the brown and finish coats. The scratch coat is generally put on from three-sixteenths to one-quarter inch thick over the laths, and is pressed by the trowel with sufficient force to squeeze it between and behind the laths so as to form a key or clinch. It is this key which holds the plaster to the laths.

When the first coat has commenced to harden, it is scored or scratched nearly through its thickness with lines diagonally across each other and about two or three inches apart. This scratching gives a better hold to the second coat. Preferably the first coat should be thoroughly dry before the second coat is put on; but as it takes more labor and time to do this, plasterers seldom wait for the first coat to dry before applying the second, unless the specifications stipulate that they must. The second, or brown coat, is put on from one-quarter inch to three-quarters inch thick; with this coat all surfaces should be brought to a true plane, the angles made straight, the walls plumb, and the ceilings level. This truing up and leveling of the work is the most particular and difficult task that confronts the plasterer. On the walls the plastering can generally be brought to a true plane by means of the grounds, if the laths are set true and the wall is not too large or without openings. On ceilings, however, there is usually nothing to guide the plasterer in his work; and the consequence is, that most ceilings, particularly in domestic work, have 'rolling' surfaces. The only way of obtaining a true plane on ceilings and on walls where the grounds are not sufficient is by screeding, which is done by applying horizontal strips of mortar 6 or 8 inches wide and from 2 to 3 feet apart all around the room. These are made to project from the first coat out to the intended face of the second coat, and while soft are made perfectly straight and out of wind with each other by measuring with a plumb, straight edge, etc. When the screeds are dry, the second coat is put on, filling up the broad horizontal spaces between them, and is readily brought to a perfectly flat surface corresponding with the screeds by long straight edges extending over their surface. Screeding is expensive work, and is seldom practiced except in the most costly buildings. The finishing coat differs somewhat in different localities. In many of the Eastern States this coat is called the skim coat, and is made of lime putty and fine white sand. It is put on with a trowel, floated down, and then gone over with a brush and small trowel until the surface becomes hard and polished. In most parts of the United States, however, it is the practice to finish with a thin coat of lime putty, plaster of Paris, and marble-dust, called a white coat. It is applied much as is the skim coat first described.

When a rough finish is desired, a sand coat consisting of lime putty and coarse sand is used. The preceding description applies particularly to the laying of lime plaster, but the hard-wall plasters are applied in almost the same manner. *Stucco-work* is ornamental interior plaster-work, such as cornices, moldings, and centre-pieces. For such work a mixture of lime paste and plaster of Paris is used except for cast-work, which is made entirely of plaster of Paris. Plain moldings of all kinds are usually 'run' in place by hand. The process consists in placing on the surface of the wall or ceiling a sufficient body of plaster and forming the molding by running along it a sheet-iron template cut to the reverse profile of the molding. Stucco-work is always done before the finishing coat of plastering is applied. If the cornice or molding contains much ornamental work it is usually cast in molds in about two-foot lengths and cemented in place with a wash of plaster of Paris. *Scagliola* is a coating applied to walls, columns, etc., to imitate marble. The base or groundwork is usually a rich lime mixture containing a large proportion of hair. After this has been set and dried, it is covered with a coat of plaster of Paris or Kane's cement mixed with various coloring matters in a solution of glue or isinglass. When thoroughly dry, this coat is rubbed with pumice-stone and carefully polished. *External plastering* is usually either rough-cast work or stucco. Rough-cast work consists of two coats of rich lime plaster applied to lathing nailed to the outside sheathing and finished with a semi-fluid mixture of clean, fine gravel, lime, and water, which is cast or thrown against the wall. External stucco-work consists of two or three coats of cement and sand plaster applied much as is interior plaster, but usually with the final coat marked with lines to imitate stone masonry and colored with some pigment. *Staff* is a mixture of plaster of Paris or lime plaster, with water and hemp-fibre, which is cast in molds into blocks, slabs, and trimmings of all sorts, and fastened by nails to wooden frames and boarding. The great majority of modern exhibition buildings have been made of staff.

CARPENTRY is the process of cutting, framing, and joining the timbers of buildings by means of hand-tools. In building work, it includes the framing of the main structural skeleton or framework, covering it with rough boarding, clapboards, shingles, etc., the construction of windows and door-frames and of cornices, gutters, etc. Interior woodwork is here classed as joinery; but the distinction between the two processes is not sharply defined in practice, and in America carpenters erect the interior woodwork as well as other parts. In modern building practice wooden buildings are framed in three ways. Previous to 1830 the braced or full frame was alone used. In this method of framing the sills, girts, posts, and plates are made of heavy timbers, and are all mortised and pinned together. Braces are mortised and pinned to post, sill, and girt, and studding is mortised and pinned to sills, girts, and plates. To frame a building in this way, it is necessary to cut all the pieces and make all the

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mortise-holes, etc., on the ground; then fit the pieces together, and finally raise the whole side of the framework at once. For the smaller and cheaper wooden buildings, balloon framing (Figs. 15 and 16) is now nearly always used.

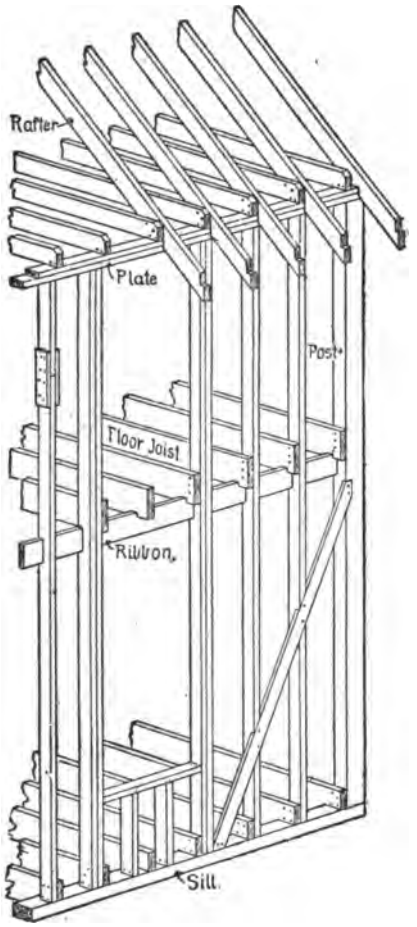

FIG. 15. BALLOON SIDE AND FLOOR FRAMING.

In this method of framing the timbers used are comparatively small and light, and all connections are made by nailing and spiking. The usual mode of procedure is to lay the sills, which are halved and spiked together at the corners, and then connect them with the first floor-joists com-

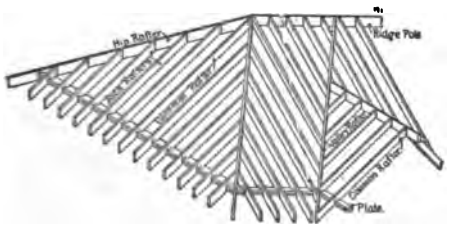

FIG. 16. BALLOON ROOF-FRAMING.

plete. The posts are next erected and held in place by spiking them to the sill and by temporary bracing. The common studding is next erected and secured in a similar manner to the posts. Generally the posts and studding extend from the sill to the plate without splicing. At the second-floor level a timber called a false girt or ribbon is notched and nailed to the inside edges of posts and studs, to carry the ends of the second-floor joists. On the top of the posts and studs is placed the plate which carries the attic-floor joists and the lower ends of the rafters. It will be noted that in this method the framing of joists is confined practically to the simple process of halving and notching.

For the better classes of residences and frame buildings, a combination of braced and balloon framing is often employed. The braced frame is adopted as far as the sills, joists, girts, and braces are concerned; but the common studding is mortised at the lower end only, and spiked at the upper end, and generally the plate is made of two thicknesses of plank spiked together and to the studs exactly as in simple balloon framing.

For buildings of a moderate size, simple timbers are adequate in most cases for even the largest members of the framework; but in large buildings, where long beams and girders are required for roof-trusses and other purposes, it is necessary to use combination members made up of two or more timbers ingeniously spliced and clamped together, so as to act as a single timber. These special constructions are considered further on, in connection with the discussion of joints, splices, etc. When the framework has been erected, the next process is to cover it with its integument of sheathing and roofing.

The first covering of the sides consists of rough boarding or sheathing nailed to the outside edges of the studs. On this sheathing are nailed the clapboards, siding or shingles which form the outside surface of wooden buildings generally. Roof-boarding varies from a covering of closely matched and dressed boards for tin roofs to slats laid at intervals of two or three inches for shingle roofs. The process of rough-boarding is one of the most simple processes in the art of carpentry. The laying of clapboards and shingles, however, calls for more skill—first, to preserve uniform widths exposed to the weather; and, second, to insure that the vertical joints do not coincide and leave a crevice for moisture to pass through. *Clapboards* are narrow, thin boards, thicker at one edge than at the other. The usual dimensions are: length, 4 feet; width, 6 inches; thickness at butt, ½ inch; at opposite edge, ⅛ inch. They are laid horizontally with the butt edge downward, the butt of each overlapping the thin edge of the next, and are nailed to the sheathing. *Siding* has a similar section to clapboards, but is thicker, and is sawed in lengths of 10 to 16 feet. It is applied similarly to clapboards. *Shingles* are used to cover both sides and roofs. They are put on by commencing at the eaves or lowest corner, and laying horizontal courses either to line or straight-edge. Each course is partially overlapped by the course next higher, and is nailed to the roof-boarding.

In carpentry, *joints* and *fastenings* of numerous forms are used; they all, however, serve either to join two timbers end to end to form a continuous beam, or to join the end of one timber to the side or edge of another. One method of lengthening a beam or of joining two timbers end to end is to abut the ends, place a timber on each side, and firmly bolt all three timbers together. This is termed fishing or a fished joint.

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Another method, used when it is desirable to preserve the same breadth and depth throughout, is to cut the beams partly through a little distance back from the ends, one on the top and the other on the bottom, remove the portion cut through and lap the halved ends together with bolts. This process is called scarfing. To connect the ends of one timber to the side or edges of another various forms of notched and mortised and tenon joints are used (Figs. 17 to 20). These various joints and fastenings are

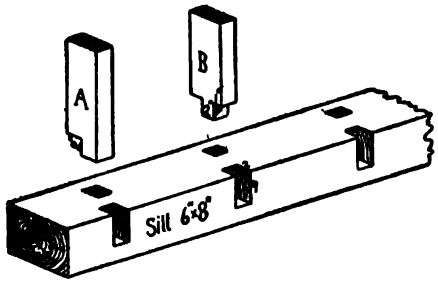

FIG. 17. MORTISED FOR TENONED JOINTS AND NOTCHED FOR FLOOR-JOINTS.

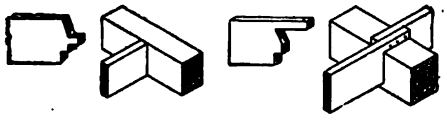

FIG. 18. TYPES OF MORTISE AND TENON-JOINTS FOR JOISTS AND GIRDERS.

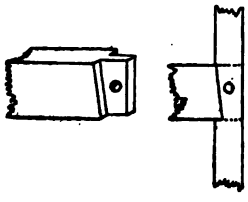

FIG. 19. MORTISE AND TENON-JOINT OF GIRT AND POST.

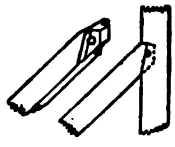

FIG. 20. MORTISE AND TENON-JOINT OF BRACE AND POST.

explained by the accompanying illustrations. Various methods of building up beams from two or more timbers are employed in carpentry, but the most efficient beam of this character has been shown to consist of two timbers bolted together with a key between every pair of bolts (Fig. 21). The tools used by the carpen-

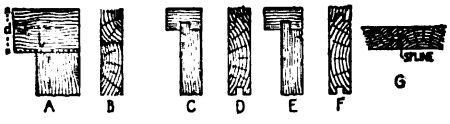

FIG. 21. JOINTS—A AND B, BUTT-JOINTS; C, D, E, AND F, TONGUE AND GROOVED JOINTS; G, SPLICED JOINTS.

ter comprise handsaws for cutting timber to length; planes of various sorts for smoothing the ends, edges, and surfaces of timber; mallets and chisels for cutting mortises; tenons, notches, etc.; and hammers, hatchets, axes, adzes, squares, rules, bits, augers, etc., for general work. These tools are described under WOODWORKING TOOLS AND MACHINERY.

JOINERY, as stated above, is here considered to comprise the more intricate and careful processes of cutting, framing, and joining wood for interior finish and fittings. As a matter of fact, a large part of what once constituted joiner's work is now done at mills or woodworking shops. Interior woodwork is usually divided into standing finish, that is, the woodwork that is affixed to the walls as casings, baseboards, wainscoting, etc., and fittings like cases, cupboards, drawers, and shelves. A very important requirement for interior woodwork is that all joints shall be as tight and inconspicuous as possible, and in fact it was in the character of the joints and in the smooth surfaces and smaller dimensions of the pieces that the original distinction between joinery and carpentry arose.

The various joints made in connecting interior finish and fittings may be classified under one or more of the following kinds, namely: butt-joints, tongued and grooved joints, spliced joints, mitred joints, coped joints, covered or housed joints, glued and blocked joints, and dovetailing; and the work is said to be butted, notched, mitred, coped, housed or rebated, glued and blocked, or dovetailed, according to the kind of joint that is made. Very frequently two or three operations are combined in a single joint. The accompanying illustrations show the nature of the joints named (Figs. 22 to 25). As

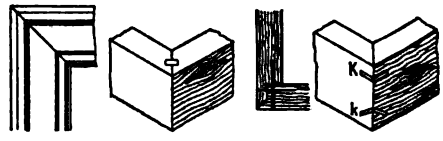

FIG. 22. MITRED JOINTS.

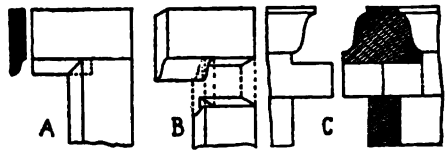

FIG. 23. COPED JOINTS.

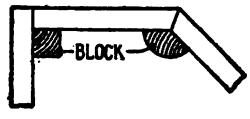

FIG. 24. GLUED AND BLOCK JOINT.

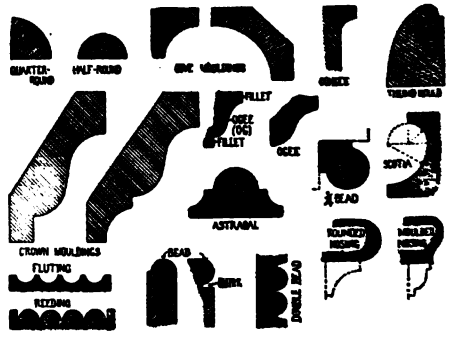

FIG. 25. FORMS OF MOLDING.

a rule, casings, baseboards, moldings, and wainscoting boards are cut and dressed at the mill,

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so that the carpenter's work at the building comprises the joining and erecting. Doors, cases, paneled work, staircases, and mantels are nearly always made at the shop, and have only to be erected by the carpenter. The illustrations show some of the many forms in which moldings, casings, etc., are supplied by the mills (Figs. 26 and 28).

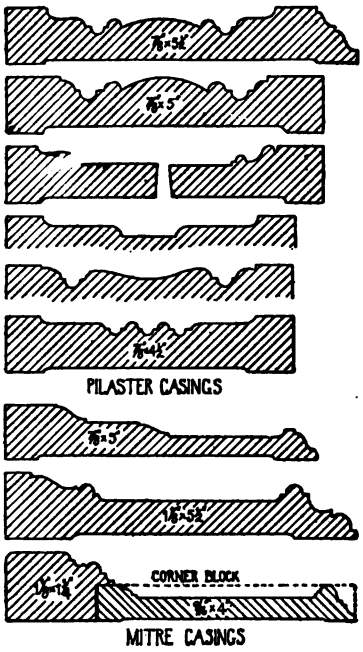

FIG. 26. FORMS OF CASINGS.

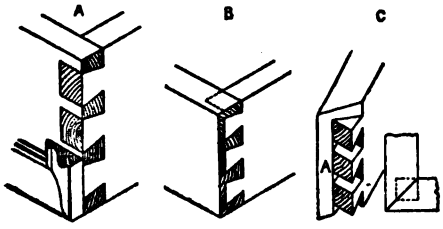

FIG. 27. DOVETAILED JOINTS: A, COMMON; B, LAPPED; C, SECRET.

GLAZING is the process of applying glass to windows, doors, etc. Windows and doors are usually glazed at the mills and supplied ready for erection. Common window-glass is almost always set with putty and secured with triangular pieces of zinc, called 'glazier's points,' driven into the wood over the glass and covered with putty. In the best work, a thin layer of putty is first put in the rebate of the sash, and the glass placed on it and pushed down to a solid bearing. This is called back-puttying. The points are then driven about eight or ten inches apart, and putty applied over the glass and points so as to fill the rebate. Outside windows are always glazed on the outside of the sash. Plate-glass windows are back-puttied and secured by wooden bends. Leaded glass is usually finished and set by firms which make a specialty of ornamental or 'stained' glass.

PLUMBING, PAINTING, and HEATING and VENTILATION also must be considered in their relation to building, and will be found discussed under these heads.

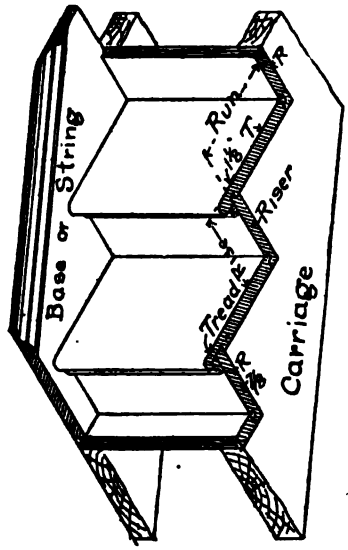

FIG. 28. STAIR-FRAMING.

BIBLIOGRAPHY. The books treating of building processes are very numerous and a number of periodicals are also supported by the various building trades. The best general treatises on American building practice are Kidder, *Building Construction* (11 vols., New York, 1898); id., *Architects' and Builders' Pocket-book* (New York, 1898); Anderson, *The Strength of Materials and Structures* (London, 1887); Becker, *Allgemeine Baukunde des Ingenieurs* (Leipzig, 1882); Huss, *Rational Building*, translated from article "Construction" in Viollet-le-Duc, *Dictionnaire Raisonné* (New York, 1895); *Notes on Building Construction* (London, 1875); *Advanced Building Construction* (London, 1892), both of the above issued for the South Kensington Schools; *Baukunde des Architekten* (Berlin, 1890); Guastavino, *Essay on the Theory and History of Cohesive Construction* (Boston, 1893).

BUILDING ACTS. Statutes restricting to a greater or less extent the common-law right of landowners in cities to erect buildings on their land. They often prescribe the materials of which buildings shall be constructed; the manner in which they shall be lighted, ventilated, or drained; the amount of open space about them, as well as their height and their distance from the street line. In general, the interference of such statutes with the property rights of the citizen is justified by considerations of public policy. Specifically their object is to secure proper sanitary conditions and to diminish the frequency and disastrous consequences of fires in cities. In the United States the constitutionality of such legislative interference with property rights has been sustained as coming within the police powers (q.v.) of Congress and of the several States. The most important statutes of this kind in England are the London Building Act of 1894 and the Public Health Act of 1875. In the United States such matters are usually regulated

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by city ordinances, although the construction and sanitation of tenement-houses in New York and other large cities has become the subject of State legislation. Consult: Emden, *Law Relating to Building* (London, 1895); Ash, *Building Code of New York City* (New York, 1899); "New York Tenement House Act," *Laws of New York*, 1901, chap. 334.

BUILDING AND LOAN ASSOCIATIONS. Private corporations designed to furnish a safe means for the accumulation of savings, accompanied with an opportunity to secure money at reasonable rates for the purpose of building homes. The term is here used to cover a variety of organizations with similar purposes and methods of business, as mutual loan associations, homestead aid associations, savings fund and loan associations, coöperative banks, coöperative savings and loan associations, building societies, etc. In Great Britain the organizations exist under the latter title, while in Germany they are known as Baugenossenschaften. The first in England was organized in Birmingham in 1781. They became numerous during the Nineteenth Century, and acts were passed in 1838 and in 1874 regulating them.

The first association of this character in the United States was organized in Frankford, a suburb of Philadelphia, in 1831, under the title of The Oxford Provident Building Association. Many were organized in the decade from 1840 to 1850, which may be considered as the real period of their inception in this country. According to the ninth report of the Commission of Labor, issued in 1893, there were at that time 5838 building societies in the United States, of which 5598 were local and 240 were national organizations. Pennsylvania led the other States in the number of these organizations, having 1079; while Ohio followed with 721. The total amount paid in, plus the profits in all the associations, amounted to $450,667,594; but 35 of the associations showed a loss at the close of the fiscal year amounting to $23,332.20.

When a man becomes a shareholder in a building and loan association, he pays a certain sum each month until the aggregate amount paid, increased by profits, equals the maturing value of the share, which is usually $200. If a man becomes the possessor of a share and pays $1 a month, it would require 200 months (16⅔ years) to pay for the stock; in practice this time is very much shortened, as the money paid in is immediately loaned out, and members get the advantage of compound interest on all sums paid in. The capital of the association is thus made up of the savings, and interest upon the savings, of its members, and is increased from month to month and from year to year. Provisions are made in all associations for the withdrawal of members before the shares mature. On this account, a share, before it matures, may be said to have two values—the holding and the withdrawal values. The former is the actual value at a particular time. The latter is frequently much less than the actual value. All associations stipulate the conditions under which members may withdraw before their shares mature, and, while these conditions differ, they are of such a nature as to discourage severing connection with the association.

The second purpose of the associations is to enable people to borrow to build homes. For this purpose provisions similar to the following are made: If a man owns a lot and desires to borrow $1000 to build a home, he must purchase five shares of stock at $200 each. If the stock sells above par, those borrowing must bid a premium, and the highest bidder receives the loan. He gives a mortgage on the lot and pays in monthly installments, which include principal and interest, until the stock is paid for.

The building and loan associations in the United States are divided into the national and local associations. These differ mainly in the scope of their operations, as the methods of organization and management of them are practically identical. The local association limits its operations to a community, often a county, while the national association makes loans anywhere and sells shares to individuals regardless of residence. Both organizations are under the control of a president and board of directors; however, the secretary and the treasurer are usually the most important factors in their management. A property committee usually passes judgment on securities before money is loaned. Failures of the associations are due to inefficient management and especially to granting loans without adequate security. Five States, New York, Massachusetts, New Jersey, Ohio, and Illinois, require these associations to make annual returns, the same as is required of savings banks. In all the other States, no control whatsoever is exercised over them.

There can be no doubt that if people would save and place their money at interest in savings banks until an adequate amount had been accumulated to enable them to build, it would be much less expensive to secure homes in this way than by purchasing building and loan association stock. The way in which the borrowers in building and loan associations receive interest on all sums paid in blinds them to the real rate of interest they pay. The non-borrowers often receive 10 per cent. interest and over on all sums invested, and the borrowers, as a class, must pay this. Few men of means would think of building from funds received from building and loan associations. These associations have an advantage over savings banks in one respect—as the dues of members must be paid regularly, there is a constant pressure to save. The educative influence is its most commendable feature. People are taught to save and become property-owners, and are interested in providing for the future, who otherwise would live a hand-to-mouth struggle for existence. Consult: Rigley, *How to Manage Building Associations* (1873); Dexter, *A Treatise on Coöperative Savings and Loan Associations* (New York, 1889); Thompson, *A Treatise on Building Associations* (2d ed., Chicago, 1899); *Ninth Annual Report of Commissioner of Labor* (Washington, 1893).

BUILDING LOANS. Loans made to persons who are owners or lessees of land, to be used by them in defraying the cost of buildings to be erected by them on such land. Such loans are usually made under a contract, which recites the nature of the borrower's interest in the land, sets out in detail the character and estimated cost of the structure to be erected, and contains a promise by the borrower to use the money so obtained exclusively for the building operations mentioned in the contract, and according to its terms. The loan is generally

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secured by a mortgage on the property in question to cover the future advances on the loan, which are made in stated installments as the building progresses. Such loans are usually somewhat precarious investments, because of the danger that the builder may not be able to complete the structure, in which case the incompleted building usually cannot be sold for what it cost, and the mortgagee is forced to foreclose the mortgage, buy in the property, and complete the building, in order to protect himself. Building loans, therefore, bear a higher rate of interest than is usual in loans on real-estate security. Many States have provisions for the filing of such contracts in some office of public record, as well as for recording the mortgages, regulating their priority with reference to other liens, as judgments and mechanics' liens (q.v.). Such loans are usually paid off when the building is completed, because of the high rate of interest, the money being obtained on a 'permanent loan' (that is, a loan for a definite number of years) at a lower rate of interest. Building loans of this description have become very common in recent years, especially in large cities. The term is also applied to loans by building and loan associations (q.v.).

BUILDING OF THE SHIP, THE. A poem by H. W. Longfellow (1849).

BUILDINGS, FIREPROOF. See FIREPROOF CONSTRUCTION.

BUILDING SOCIETIES. See BUILDING AND LOAN ASSOCIATIONS.

BUILDING-STONE. A stone suitable for structural engineering and architectural purposes. To be suitable for these purposes, stone should be durable and of a good and permanent color, should have strength and toughness, and, finally, should be inexpensive to quarry and work. The majority of the best building-stones belong to one or the other of the following general classes of rocks: (1) Crystalline siliceous rocks, of which granite is the most familiar example; (2) calcareous rocks, to which belong limestones and marbles; and (3) fragmentary rocks, in which class sandstones and slates are included.

GRANITE (q.v.).—Of the crystalline siliceous rocks, granite is undoubtedly the best known and most deservedly popular as a building-stone. Commercially, this term granite is applied to all igneous and metamorphic rocks (see IGNEOUS ROCKS; METAMORPHIC ROCKS); but still the use of true granites predominates. They, together with syenites, include the strongest of building-stones, ranging in crushing strength from 25,000 to 30,000 pounds per square inch or more. They are very resistant to frost action, and are commonly permanent in color. Until comparatively recent times, on account of its great hardness, granite was employed almost wholly for massive masonry, since it could be used there with a comparatively rough dressing; but with modern improved stone-cutting and dressing machinery, it is now turned and carved into columns, pilasters, etc., and polished with the utmost perfectness. In all times, however, granite has been one of the most popular of building-stones. The red granite of Syene, Egypt, was fashioned by the ancient Egyptians into obelisks, sarcophagi, and colossal statues, and employed by them in building their temples, pyramids, and palaces. The Egyptian granite was red in color. Modern granites range in color from nearly white to dark gray, and from a delicate pink to a deep red. The average weight of granite is about 166½ pounds per cubic foot, and its crushing strength is from 5000 pounds to 20,000 pounds per square inch. Suitable granite for building purposes is found widely distributed. The Scotch granites are the coarse red from Peterhead and the gray from Aberdeen. It is of the latter stone that the city of Aberdeen is largely built. Scotch granite is quite largely imported to the United States for monumental work. Both gray and red granite are quarried in Canada, stone of one or both colors occurring in British Columbia, near Victoria; in Quebec, in many localities around the lakes at the heads of the Saint Francis and Megantic rivers; in Ontario, near Kingston; in New Brunswick, near Saint George; and in Nova Scotia, near Shelburne. The principal English granite is perhaps that from Westmoreland County.

In the United States, granite is quarried in practically every State bordering on the Appalachian Mountain Range, and in California, Colorado, Montana, Wyoming, Wisconsin, and Missouri. The greatest supply of granite in this country comes from Maine and Massachusetts. The Maine granites are mostly found in shades of gray, but there are a number of pink and red granites quarried. In Massachusetts, the dark blue-gray granites quarried in the vicinity of Quincy are the best known. Other noted granites come from Concord, N. H., Westerly, R. I., Richmond, Va., Iron County, Mo., Barre, Vt., and Saint Cloud, Minn. Besides granite, the crystalline siliceous rocks include porphyry, syenite, gneiss, and trap. Porphyry makes a very handsome building-stone, showing large crystals imbedded in an amorphous ground-mass, the crystals usually being of a contrasting color to the ground-mass, and these colors ranging through the shades of pink, gray, red, white, and black. Porphyry is so extremely hard that no commercial means have been found for cutting and polishing it, but it is used to some extent in rough construction. Massachusetts, New Hampshire, Pennsylvania, Wisconsin, and North Carolina contain fine beds of unusually beautiful porphyry. Syenites differ from granite in containing no quartz. They are found in considerable quantities in the United States, and make a very handsome stone, but so far they have not been quarried to any extent. Gneiss is a rock much resembling granite in composition, but is unlike granite in having well-defined planes of cleavage, which allow the rock to be split into thick slabs. Trap includes a number of crystalline siliceous rocks, generally sombre in hue and very difficult to work. Except as crushed for making concrete or road material, or when cut into paving-blocks, trap is seldom used for construction purposes. A dark-colored trap commercially known as 'black granite' is quarried near Duluth, Minn.; at Keeseville, N. Y.; Vergennes, Vt.; on the Maine coast; and at some other points, and is extensively used for tombstones.

LIMESTONE.—Limestone consists of carbonate of lime and some impurity which gives the stone its color, these colors ranging through various shades of blue, green, yellow, pink, red, and

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black. Dolomitic limestone, or dolomite, is a species which contains magnesia in addition to carbonate of lime. The distinction between limestone and marble is one of quality rather than one of composition, marble being a crystalline limestone capable of taking a high polish, and having a coloring or marking which adapts it to ornamental work. The coarser grades of limestone are widely distributed, and nearly every State of the United States has quarries which are worked to supply at least the local demand. Perhaps the most widely known of the limestones of this country are those of Indiana and northern Kentucky. These are oölitic limestones; they are very fine and even in texture, strong and easily worked, and of handsome color. This limestone is popularly known as 'Bedford stone.' At Lamont and Joliet, Ill., there are also notable quarries of fine-grained, light-drab limestone, which is extensively employed. Among the foreign limestones, the Portland stone, from the Isle of Portland, England, has been favorably known for a great many years. It was used in the reconstruction of Saint Paul's Cathedral. The Caen stone (q.v.) of France is one of the most noted limestones of the world. It is a soft, fine-grained stone, very light colored, admirably adapted for carved work, but so absorbent as to be entirely unfitted for out-of-door work in a cold climate. The stone is quarried near Caen, Normandy.

The principal sources of American marble are in the States bordering the Appalachian Mountains, and particularly Vermont, Massachusetts, western Connecticut, eastern New York, Georgia, and eastern Tennessee. Nearly 60 per cent. of the marble quarried in the United States comes from Vermont. Vermont marbles range through all varieties of texture and various shades of color, from pure, snowy white to quite dark-bluish and greenish stone, the white stone often being beautifully mottled and veined with the darker stone. The principal centres of the Vermont marble industry are West Rutland, Dorset, Wallingford, Pittsford, Brandon, and Middlebury. Next to the Vermont marbles, those of Tennessee merit the most particular notice, because of their beautiful variegated colors, among which are found chocolate, red, pink, olive, green, brownish-red with white spots, gray with lemon spots, and other combinations of colors. Georgia contains very large marble deposits, some of which furnish very beautiful stone, and this, with the fact that the climate permits quarrying the year round, is developing an active marble industry in this State. Besides the Appalachian marbles, there are deposits of this stone in several of the Rocky Mountain States, but these have not been much worked.

Among the most notable foreign marbles are the brilliant red marble found at several localities in the French Pyrenees, and the Languedoc marble, having a brilliant scarlet color blotched with white, found at Black Mountain, in the Pyrenees. Brocatelle marble, having a light yellow body traversed by irregular veins and blotches of dull red, is another famous French marble. Belgium is exceptionally rich in colored marbles, but white is not found. The deep blue-black marble with white veins, known as Saint Anne marble, and the pure black marble, known as Belgian black, are particularly well-known Belgium marbles. Most of the other Belgium marbles are dull red, of light and dark shades, variously spotted, flecked, and veined with white and gray. The Italian marbles are proverbial for their quality and variety. The two most noted are the white statuary marble with its fine grain and pure color, which, when polished, gives a waxy appearance found in no other marble; and the Siena marble with a bright yellow ground blotched with slight purplish and violet shades. The black and gold marble, with a black ground carrying yellowish and reddish veins, is another noted Italian marble. Germany, Spain, Portugal, Austria, and Ireland furnish marbles notable for texture and color. A form of marble—variously known as onyx, or onyx marble, or alabaster; but really a travertine formed by the evaporation of water holding carbonate of lime in solution—is found extensively in Algeria and Mexico, and is much used for table-tops and other small decorative and ornamental work. A good quality of onyx marble is found in Arizona and Southern California, in the United States.

SANDSTONES (q.v.).—Sandstones are composed of rounded and angular grains of sand, so cemented and compacted as to form a solid rock. The cementing materials are silica, oxide of iron, and carbonate of lime. Silica cement gives a white colored stone, very firm and durable, but difficult to work; oxide of iron cement gives a brownish or reddish stone of fair durability and fairly easy to work; and carbonate of lime gives a grayish stone soft and easy to work, but less durable than when either oxide of iron or silica forms the cementing material. Some sandstones have a clayey cement, which is more objectionable than any of the others, and other sandstones contain little, if any, cement, owing their tenacity to the pressure under which they were consolidated. Often the cemented grains comprise feldspar and mica, as well as sand. The texture of sandstones varies from exceedingly fine-grained stones to those composed of pebbles of various sizes. The latter are called conglomerates if the grains are rounded, and breccias if they are angular. Sandstones vary in color: light gray, buff, drab, blue, brown, pink, and red being the colors of well-known varieties. Sandstones generally are softer when quarried than after a period of seasoning.

Good sandstone for structural purposes is found so widely distributed in the United States that it is impossible to mention all of even the notable deposits. The Berea stone, of Ohio; the Medina stone and bluestone, of New York; the Portland stone, of Connecticut and Massachusetts; and the red and brown sandstones, of New Jersey, are among the most extensively quarried and best known. Of the foreign sandstones the variety is quite as great as in the United States.

SLATE. Slate is an indurated siliceous clay which easily splits into sheets of considerable thinness. It is used chiefly for roofing purposes, mantles, floor-tiles, and flagging, billiard-tables, sinks, and blackboards. Slate is quarried in a number of States, but principally in Maine, New York, Pennsylvania, and Vermont, the production of the last two States being the greatest. Since 1897 the United States producers have begun to build up an export trade which bids fair

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to become permanent. In Europe the Welsh slate-quarries and those of Ardennes, France, are the greatest producers.

QUARRYING AND DRESSING. The methods of quarrying building-stone vary according to the nature of the stone. In all methods the object aimed at is to obtain large and well-shaped blocks free from incipient fractures. For this reason the use of explosives is resorted to as little as possible. (See QUARRYING.) Dressing stone is very largely hand work, although many kinds of machinery are also employed for polishing, planing, and sawing soft stones, and for splitting slate. See STONE-CUTTING AND DRESSING.

DURABILITY. The ability of a stone to resist deterioration by changes in weather and temperature, by chemical agencies in the atmosphere and rain, by growing organisms, and by ordinary wear and tear—or, in other words, the durability of a building-stone—is obviously an important factor in its value for construction purposes. Granites are liable to disintegration chiefly from the constant contraction and expansion caused by natural temperature changes. They absorb very little water, and thus suffer very little from the expansion of the contained water when frozen, and they are not much affected by any of the chemicals ordinarily carried in the air and rain. Limestones suffer less than granite by mere expansion and contraction, but make up for this by greater susceptibility to the chemicals in the air and rain. They do not absorb much water, and are therefore but little disturbed by its freezing. Sandstones, being porous, absorb more water than limestone or granite, and are particularly subject to disintegration by freezing. The following figures from the United States census of 1890 show the life of various kinds of building-stone in New York City:

KIND OF STONE	LIFE IN YEARS
Coarse brownstone	5 to 10
Fine laminated brownstone	20 to 50
Compact brownstone	100 to 200
Coarse fossiliferous limestone	20 to 40
Fine oölitic limestone	30 to 40
Marble, coarse dolomitic	40
Marble, fine dolomitic	60 to 80
Marble, fine	50 to 100
Granite	75 to 200
Nova Scotia sandstone	50 to 200

Speaking generally, the durability of any stone depends on its relation toward atmospheric agencies. If a stone is dense, there is little pore-space for moisture to soak in and exert a prying action when it expands in freezing. Many stones contain small quantities of moisture naturally, which is known as quarry-water, and the freezing of such water, if the stone is quarried in cold weather, may aid in the disintegration of the rock. If the rock is quarried in warm weather, the quarry-water is evaporated, and any mineral matter which it holds in solution is deposited around the grains of the stone, cementing them together, and this is why some stones harden after quarrying. The porosity of building-stone, or its absorption, is variable, being from ½ to 2 per cent. in granites, 2 to 4 per cent. in limestones, and 2 to 8 per cent. in sandstones. The hardness and crushing strength of a stone depends on the firmness with which the particles are bound together. In igneous and metamorphic rocks the particles are interlocked as the result of crystallization. In sedimentary rocks the individual grains are bound together by cementing material, such as silica, iron oxide, or lime carbonate, which has been deposited between them as described above. In trying climates a stone must be hard and dense to insure durability, but in mild climates very soft, porous stones can often be employed. The resistance which a stone offers to frost action is often tested by soaking it in water, and then freezing it, the process being repeated a number of times, and note taken of any disintegration that occurs. A second but inaccurate method consists in boiling the stone in a sulphate of soda solution and then allowing it to dry; the swelling of the soda-crystals in forming as the water evaporates exerts a far greater pressure than frost action. The liability of building-stone to decay is sometimes increased by the presence of injurious minerals. Pyrite grains decompose, yielding rust-stains, and mica at times behaves in a similar manner. Marbles may contain both pyrite and actinolite, the decomposition of the latter yielding little bits of greenish clay that absorb moisture.

The crushing strength of a stone is often very great, indeed far greater than is really necessary. Granite and syenites are among the strongest, having a crushing strength of 25,000 to 30,000 pounds per square inch; sandstones range from 10,000 to 15,000 pounds; and limestones and marbles 8000 to 12,000 pounds per square inch. The lower limit even is probably sufficient in most cases.

Various kinds of solutions have been tried for preserving the life of stone, but none of them have been found to be perfectly satisfactory. For the strength of various kinds of building-stones, see STRENGTH OF MATERIALS. See also BATHSTONE; BROWNSTONE; CAEN STONE; FREESTONE; GRANITE; LIMESTONE; MARBLE; SANDSTONE; SLATE; STONE, ARTIFICIAL; BUILDING; and MASONRY. For comprehensive popular treatises on building stones, consult: Hall, *Treatise on the Building and Ornamental Stones of Great Britain* (London, 1872); Merrill, *Stones for Building and Decoration* (New York, 1891); Johnson, *The Materials of Construction* (New York, 1899).

BUISSON, bwē'sôn', FERDINAND EDOUARD (1841—). A French legislator, publicist, and pedagogue. He was born in Paris in 1871, and was appointed inspector of elementary schools by Jules Simon, then Minister of Public Instruction. His nomination was bitterly attacked, more particularly by Dupanloup, Bishop of Orleans, who denounced in the National Assembly several pamphlets published by Buisson in which he recommended the exclusion from the schools of all moral instruction not purely secular, and the omission of sacred history from the curriculum of the younger pupils. Compelled to resign, Buisson was afterwards appointed commissioner to the expositions held in Vienna (1873) and Philadelphia (1876). In 1878 he became chief inspector of elementary education, and in the following year Jules Ferry appointed him director of that department. The introduction of the new education in the elementary schools under his jurisdiction has been remarkably rapid. In 1896 he resigned and was appointed to the chair of pedagogy at the Faculté des Lettres. He is the author of a *Dictionnaire de pédagogie* (1882-84).

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BUITENZORG, boi'ten-zôrk (Dutch *buiten*, without + *zorg*, Ger. *Sorge*, Engl. *sorrow;* equivalent of the French *sans-souci*). A town of Java in the Presidency of Batavia, about 40 miles south of the capital (Map: Australasia, C 3). It is a place of exceptional natural beauty, and its elevated location (about 750 feet) makes it one of the healthiest settlements in Java. It is the real seat of the Governor-General, whose magnificent palace is situated amid the botanical gardens, which are considered the finest examples of the horticultural art. It is also the most fashionable summer resort of the island and is connected by rail with Batavia.

BUJALANCE, bōō'hâ-lăn'thâ (probably the ancient Vogia). A city of Andalusia, Spain, about 20 miles east of Córdoba (Map: Spain, C 4). It is surrounded by a moat and a wall flanked with old towers, and contains an old Moorish castle (935) and a college. The city has manufactures of leather, woolens, glass, and pottery, and exports of agricultural produce. An important cattle fair is held here. Population, in 1900, 11,245. Various remains found in the vicinity bear witness to the antiquity of the city, but its identity as an ancient town is in doubt. Bujalance attained to prosperity under the Moors, and in 1227 was conquered by Ferdinand III.

BUKA, bōō'kâ. The northwesternmost of the Solomon Islands, separated by Bougainville Strait from Bougainville Island. Mangrove swamps line the coast. The interior is mountainous and densely populated.

BUKHAREST. See BUCHAREST.

BUKHARI, bu-kä'rê, or **BOKHARI,** bô-kä'rê, ABU ABDALLAH MUHAMMAD IBN ISMAIL AL (810-870). An Arabic scholar, the great imam in the science of the *hadith*, or traditions. He was born at Bokhara (whence his name), and he early devoted himself to the study of Mohammedan traditions. At the age of 17 he made the pilgrimage to Mecca and to Medina, and he subsequently visited nearly every part of the Mohammedan world, associating with the most distinguished representatives of the *hadith*, and collecting in Khorasan, in the cities of Irak, in the Hijaz, in Syria, and in Egypt a great number of traditions, 7275 of which he arranged and classified in his celebrated work, *Al-Jami al-Sahih* (The Authentic Collection), regarded by Mohammedans as the most sacred book after the Koran. It is said that 90,000 persons had learned the *Sahih* from Bukhari. He died in prison at Bagdad. There is an edition of Bukhari's work published in three volumes by Krehl (Leyden, 1867-68).

BUKIDNONE, bōō'kĕd-nō'nâ, or BUQUIDNONE. A wild Malay people in Misâmis Province, Mindanao. See PHILIPPINES.

BUKIL, bōō-kĕl', or BUQUIL. See MANGUIAN.

BUK'KUM-WOOD. See SAPPANWOOD.

BUK'KUR. A fortified island of the Indus, in Sindh, British India, in latitude 27° 39′ N. and longitude 68° 56′ E. It is 400 yards from Rori, on the left bank, and 100 from Sukkur, on the right. Bukkur is no longer of any military value, commanded, as it is, on both sides, by higher grounds, but is important as the central point of the great railway cantilever bridge 1200 feet long spanning the Indus here since 1889.

BUKOWINA, bōō'kô-vē'nâ ('the country of beech-trees,' from Slav. *bukŭ*, Ger. *Buche*, Eng. *beech*). A duchy of the Austro-Hungarian monarchy, included in Cisleithania, bounded by Galicia on the north and northwest, Hungary on the west, Rumania on the south, and Rumania and Russia on the east. Its area is 4035 square miles (Map: Hungary, J 3). Bukowina belongs mainly to the region of the Carpathian Mountains, by which it is traversed in several parallel chains. It is watered chiefly by the Pruth and the Dniester, besides a few minor streams taking their rise in the province. The climate, although somewhat raw, is generally healthful. The soil is very productive, especially along the Pruth and Sereth. About 28 per cent. of the productive land is under tillage, while over 43 per cent. is under forests. The common European cereals and industrial plants are raised in abundance, and the extensive areas of pasture land render the country well adapted for cattle-raising. The mineral production is of little importance, and the manufacturing industries are largely confined to brewing and distilling. The commerce is little developed, although the province is well provided with transportation facilities, both in the shape of roads and railways, as well as waterways. The Diet of Bukowina is composed of 31 members, of whom 10 represent the landed aristocracy, and 12 the rural communities, the remainder representing cities, chambers of commerce, etc. In the Lower House of Austria, Bukowina is represented by 11 delegates, including 2 elected by universal suffrage. Education is well advanced in Bukowina, which possesses, besides the university at Czernowitz, a number of gymnasia and other institutions for secondary education. The 379 elementary schools were attended in 1898 by about 73,000 children, or 76 per cent. of the total school population. According to the census of 1900 Bukowina had a population of 729,921, showing an increase of 12.9 per cent. for the decade. About 70 per cent. of the people adhere to the Greek Orthodox faith, over 11 per cent. are Roman Catholics, and about 13 per cent. Jewish. In regard to nationality, 42 per cent. are Ruthenian, over 32 per cent. Rumanian, and about 21 per cent. German. The capital is Czernowitz, with a population of 70,000.

Bukowina was included in the ancient Roman Province of Dacia, and during the Middle Ages was settled by peoples of different stocks. About the beginning of the Fourteenth Century it came into the possession of Moldavia, and its principal town, Suczawa, was the seat of the Moldavian Hospodar. It was acquired by Austria in 1777, and made a crownland in 1849. Consult Kaindl, *Geschichte der Bukowina* (3 vols., Czernowitz, 1895-98); *Bukowina* (Vienna, 1899).

BULACAN, bōō'lâ-kăn'. A province and a town of Luzon, one of the Philippine Islands (Map: Luzon, Philippine Islands, F 8). The former covers an area of 965 square miles and has a population of about 230,000. The surface is mountainous and the soil is fertile and well cultivated. The province produces sugar, cacao, rice, indigo, and fruits. It contains some deposits of iron and magnetite, and the rivers yield small quantities of gold. The principal manufactures are cotton and silk fabrics. The capital, Bulacan, is situated near Manila Bay,

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about 22 miles from Manila by rail. It is built mostly of stone and has a population of about 13,200.

BULAK, bōō-läk′. A suburb and port of Cairo, Egypt, situated on the right bank of the Nile, 2 or 3 miles north of Cairo (Map: Egypt, E 2). It is connected with Cairo by an electric tramway and contains a fine mosque, foundries, a paper-mill, a factory of arms, and one of the largest printing houses in Egypt. The Egyptological museum formerly located at Bulak has been transferred to Ghizeh.

BULALACAUNO, bōō-lä′lä-kou′nô. A wild Malayan people in central Palawan Island. See PHILIPPINES.

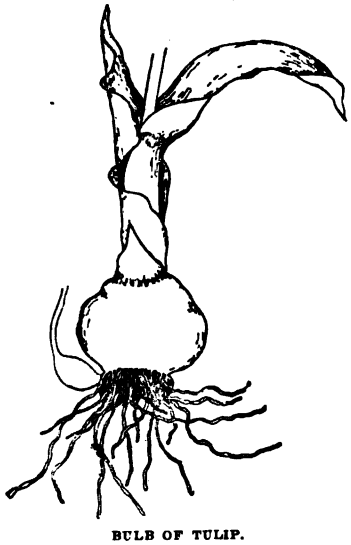
BULAMA, bōō-lä′mä. One of the Bissagos Islands (q.v.) (Map: Africa, C 3).

BULAN, bōō′län. A town of Luzon, Philippines, in the Province of Albay. It is situated 21 miles from Albay, the capital, and has a population of 11,000.

BULAU, bōō′lou (Malay), or TIKUS. A rat-like insectivore (*Gymnura Rafflesii*) of the Malayan Islands, closely akin to the hedgehogs, but without spines or ability to roll into a ball. The body is 12 to 14 inches and the tail 9 or 10 inches long; the color is black and white, with a black stripe over each eye; the fur mixed with long bristly hairs, and tail nearly naked. The animal feeds on insects, and secretes a strong odor of musk.

BÜLAU, bụ′lou, FRIEDRICH (1805-59). A German writer on political economy. He was born at Freiberg and studied at the University of Leipzig (1823-26), where he was appointed in 1833 to the chair of applied philosophy and political science. The principal works of this prolific writer include: *Encyklopädie der Staatswissenschaften* (2d ed., 1855); *Geschichte des europäischen Staatensystems* (1837-39); *Wahlrecht und Wahlverfahren* (1849); *Geheime Geschichten und rätselhafte Menschen* (12 vols., 1850-60; 2d ed., 1863-64).

BULB (Fr. *bulbe*, Lat. *bulbus*, from Gk. βολβός, *bolbos*, bulbous root). A leaf-bud, mostly



BULB OF TULIP.

subterranean, in which the leaf-bases are thickened, being full of stored food. The thickened leaf-bases are very much crowded together and form the conspicuous part of the bulb. 'Scaly' bulbs are those in which the leaf-bases are comparatively narrow and small, and are imbricated, as in the common lily. 'Tunicated' or 'coated' bulbs are those in which the leaf-bases are very large and completely enwrap one another, forming concentric coats, as in the onion and tulip. When fresh, the scales of the tunicated bulb are rather thick, but when dry they become thin, and even papery. 'Bulblets' are small aërial bulbs which either replace flower-beds, as in the onion, or which arise from the axils of leaves, as in the tiger-lily.

The significance of bulbs in the life history of the plants which produce them is that they enable the plants to develop new working structures with great rapidity. For example, a new plant completely equipped for work may be derived from a bulb in very much shorter time than from the seed. Such a habit enables plants to take advantage of short seasons of opportunity. See GEOPHILOUS PLANTS.

BULBUL, bụl′bụl. Originally an Arabic-Persian name for the Persian nightingale (*Daulias Hafizi*), which found its way into English poetry chiefly through the patronage of Lord Byron. But the same name is given in southern and southeastern Asia to various birds of the family Pycnonotidæ, especially to those of the genus Pycnonotus. These are small birds, often of very brilliant plumage, closely allied to the thrushes, occurring in India, Persia, and Palestine, and southward to South Africa. The common bulbul of India (*Pycnonotus hæmorrhous*) is a familiar visitor in small companies to all gardens, tea-plantations, etc., from Ceylon to Bengal. It "not infrequently builds its nest in verandas, and is consequently a universal favorite with Europeans." Its singing is a 'chirruping warble,' and it feeds upon fruits. The crested males are highly pugnacious—a trait utilized for amusement. Says Murray, *Avifauna of the Island of Ceylon* (London, 1890): "It is commonly caged throughout India, or kept tied by a cord around the waist. Being pugnacious, they are made to fight for small prizes, and when being trained for this purpose are fed on minced meat and a compound made of wheat flour, sugar, and milk, boiled together." A South African species (*Pycnonotus tricolor*) has the amusing habit of becoming intoxicated upon syringa-berries and fermenting fruits, when it reels along the ground and is easily captured (Layard, *Birds of South Africa*, London, 1875-84). See Colored Plate of SONG-BIRDS, and Plate of LYRE-BIRD, ETC.

BUL′FINCH, CHARLES (1763-1844). An American architect. He was born in Boston, graduated at Harvard in 1781, and spent the years 1785-87 in travel and the study of architecture abroad. His first important work was the designing in 1793 of the old Federal Street Theatre, Boston, the first playhouse erected in New England. In 1795 he drew the plans for the 'new' State House in Boston, which was completed in 1798. In 1805 he remodeled Faneuil Hall; in 1810, designed the Suffolk County Court House, in Boston, and in 1814 designed the University Hall, in Cambridge. From 1798 to 1818 he was elected annually chairman of the Board

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of Selectmen of the town of Boston, an office corresponding closely to the later office of mayor, and during this period endeavored to secure the straightening and widening of the streets, to provide a system of street-lighting, and otherwise to modernize the old town. He designed the Massachusetts General Hospital, the cornerstone of which was laid in 1818, and in the same year succeeded Benjamin H. Latrobe as architect of the National Capitol in Washington. He built the rotunda from drawings of his own, after plans suggested by Latrobe, and himself designed the west approaches and the portico, completing the building in 1830. Consult Ellen S. Bulfinch, *Life and Letters of Charles Bulfinch.*

BULFINCH, THOMAS (1796-1867). An American author, born in Boston, Mass. He graduated in 1814 at Harvard, was in mercantile pursuits until 1837, and subsequently was connected with the Boston Merchants' Bank. His literary reputation is based on his *Age of Fable* (1855), intended, in his own words, "to popularize mythology, and extend the enjoyment of elegant literature." The book sought to connect the old Greek, Roman, Norse, and Oriental narratives with modern literature. The Norse section was derived from *Northern Antiquities* (London, 1770), a translation by Thomas Percy of a portion of the *Introduction à l'histoire du Danemark* (Copenhagen, 1755-56), of the Genoese historian Mallet. In the Greek and Roman stories, ancient classical texts—in particular those of Homer, Vergil, and Ovid—were closely followed, and often freely translated. His work has been a perennial favorite, both as school-book and general manual, has appeared in a revision (1881) by Dr. E. E. Hale, and was the acknowledged source of the considerable part of the material of another similar volume—*The Classical Myths in English Literature*, edited by C. M. Gayley (Boston, 1894). Bulfinch was a friend of H. W. Longfellow, and further published *Hebrew Lyrical History* (1853); *The Age of Chivalry* (1858); *The Boy Inventor* (1860); *Legends of Charlemagne* (1863); *Poetry of the Age of Fable* (1863); and *Oregon and Eldorado* (1866).

BULGA'RIA. A principality in the northeastern part of the Balkan Peninsula (q.v.), situated mainly between latitude 41° 30′ and 44° 15′ N. and longitude 22° 30′ and 28° 30′ E. (Map: Turkey in Europe, E 3). It is bounded by Turkey on the south, Servia on the west, Rumania on the north, with the Danube forming most of the northern boundary, and the Black Sea on the east, and covers, including Eastern Rumelia, an area of 38,080 square miles. Bulgaria, like most of the Balkan countries, is very mountainous, being traversed by the Balkan Mountain chain from west to east. The southwest corner of Eastern Rumelia is covered by a portion of the Rhodope Mountains, forming deep valleys, and connected by elevated passes. The highest summits, situated in the extreme west of Bulgaria, include Musalla, 9610 feet; Vitosha, 7517 feet; and Rila, 8773 feet. Most of the rivers of Bulgaria empty into the Black Sea, some of them directly, and others through the Danube. The most important of them are the Ogust, Isker, Vid, Osma, and Lom, tributaries of the Danube. The Kamtchik and Devna empty into the Black Sea, while the Maritza (which, with its affluent, the Tunja, drains a great part of Eastern Rumania) and the Struma flow southward toward the Ægean Sea. Geologically the elevated terraces of Bulgaria are composed of Tertiary deposits, with foundations of Jurassic and Cretaceous limestones and sandstones. Deposits of gypsum and coal are found, and evidences of gold, iron, and peat.

CLIMATE. The climate of Bulgaria is on the whole healthful, with the exception of the lowlands along the Black Sea, which are often visited by malaria. The climate in Eastern Rumelia is considerably milder than in Bulgaria proper, which is generally attributed to the fact that the former is protected on the north by the Balkans. Winter in Bulgaria usually begins in the middle of November and lasts till March, while in Rumelia its duration seldom exceeds two months. The rainy season is in early spring and in autumn. The yearly temperature is about 50°, while the lowest for Bulgaria is about −8°, and for Rumelia 8°. The flora of Bulgaria is of a somewhat mixed character, combining most of the common European plants with some belonging to the East. The mountains are generally covered with trees, which are almost entirely absent from the valleys. The fauna is of considerable variety. The mountains abound in bears, wild boars, different species of deer, chamois, and most of the common European species of wild fowl. The domestic animals include the buffalo, which, together with the bull, is used for agricultural purposes instead of horses, which are scarce and of a poor breed.

AGRICULTURE. Like most of the Balkan States, Bulgaria is primarily an agricultural country. A fertile soil, in conjunction with a favorable climate, counteracts to a large extent the effect of the primitive methods of cultivation in vogue, and the crops are generally abundant. The land is greatly subdivided among the peasantry, who cling tenaciously to their small holdings. The land belongs nominally to the Government, and its occupants may hold it in perpetuity, paying the Government a certain rent in the form of a tax; the only exception is in the case of wood-land and pasture-land, which are held in common by the communes and are shared by all members without payment to the Government. Of the total area of the country, about 48 per cent. is under pasture, 25 per cent. is cultivated for cereals and vegetables, less than 1½ per cent. is under vineyards, over 17 per cent. under forest and health, the rest being under prairies, roads, dwellings, etc. The principal grains raised in the country are wheat and corn, yielding from 20,000,000 to 40,000,000 bushels each annually, according to the condition of the crops. Next in importance are barley, oats, rye, and potatoes. Fruits and vegetables are cultivated extensively, and considerable quantities of attar of roses are exported. The cultivation of silk, once a very important industry, is now almost extinct. Grapes of an excellent quality are cultivated all over the country, but the wine produced is poor, owing to the careless and antiquated methods employed in its production. A considerable hindrance to the development of agriculture is found in the present system of levying tithes in kind, which destroys every incentive to improvement. The mineral lands, as well as the agricultural, belong to the State, which works some of the coal-mines on its own account, obtaining over 100,000 tons of coal an-

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ually. Besides coal, salt is also mined, and tone is quarried.

COMMERCE AND TRANSPORTATION. The chief xports of the country are grain, animals and heir products, tobacco, fruits, cloth, and attar f roses. The imports consist mostly of textiles, netal products, arms, and coal. The trade is nostly in the hands of Greeks, Austrians, Rumanians, and Jews, and the countries participating in it most are Austria-Hungary, Germany, Great Britain, France, and Turkey. The volume f commerce shows a considerable decline during he last years of the Nineteenth Century. The alue of the imports averaged over $13,000,000 or 1896-1900, and ranged from over $16,000,000 n 1897 to less than $8,000,000 in 1900. The xports averaged during 1896-1900 over $13,500,-00, ranging from nearly $20,000,000 in 1896 to ess than $10,500,000 in 1900. Bulgaria has even seaports and nine river ports, with a total nnual shipping of about 5,000,000 tons. The hief financial institution of Bulgaria is the ational Bank, with headquarters at Sofia and ranches at the more important towns. It has a apital of 10,000,000 francs ($1,930,000) and he right to issue gold and silver notes not exeeding 13,000,000 francs ($2,509,000). There re also a large number of agricultural banks vith an aggregate capital of $6,000,000. The ailway mileage of Bulgaria is rather small in omparison with the area of the country. Including the railways of Eastern Rumelia, the total ength in 1900 was 980 miles, of which nearly 00 miles belong to the State. Sofia, the capital, s connected by rail with Constantinople and the hief centres of Continental Europe.

GOVERNMENT. In accordance with the treaty dopted by the European Powers at the Berlin Congress of 1878, Bulgaria was constituted an ereditary and constitutional monarchy under he suzerainty of and tributary to the Turkish Government. Eastern Rumelia, prior to 1885 n autonomous province of the Ottoman Empire nd administered by a Christian Governor, appointed by the Turkish Government, was put, in 886, under the direct supervision of the Prince f Bulgaria, and is at present practically a part f Bulgaria. The Constitution of Bulgaria, adopted in 1879, and amended in 1893, places the executive power in the hands of the Prince, while the egislative power is shared by him with the ational Assembly or *Sobranje*, which consists f a number of deputies—one for every 20,000 of opulation—elected by universal manhood suffrage. All legislative measures passed by the Assembly must receive the sanction of the Prince to ecome laws. The initiative may be taken both by he Prince and by the Assembly. In extraordinary ases the Grand Assembly (*Great Sobranje*) is onvened, consisting of double the number of eputies of the ordinary Assembly, and elected in he same manner. The Ministry is responsible oth to the Prince and the Assembly, and is divided into eight departments. The Ottoman Empire is represented by a commissioner. For administrative purposes Bulgaria is divided into 22 istricts or *okrugs*, subdivided into 85 *okolics*. All of them are administered by local councils lected by the people. For the administration of ustice there are district courts and justics of the eace, which have been instituted following Russian occupation. There are also three courts of ppeal and a Supreme Court in Sofia, the capital. *Education* is free and compulsory between the ages of 8 and 12. The cost of maintaining the schools is covered by the State and by the municipalities and village communities. There are some 4700 elementary schools, with 8000 teachers and nearly 350,000 pupils; 16 gymnasia, 120 lower middle schools, and 21 special and technical schools. The university at Sofia has three faculties and is attended by over 350 students. The annual budget at the beginning of this century exceeded the sum of $18,000,000. The revenue is derived chiefly from direct and indirect taxes and from taxes on commerce and industries. The public debt of Bulgaria amounted at the end of 1900 to over $43,500,000, mostly at 6 per cent. In 1899 the Bulgarian Government was authorized to convert the entire debt into one 5 per cent. loan of a nominal amount of $50,180,-000. Military service is obligatory for every able-bodied male resident, while those unfit for active service are obliged to pay an annual tax ranging from 10 to 200 francs for ten years. The period of actual service is only two years in infantry regiments and three years in other arms, and the yearly number of recruits is estimated at 16,000. The armed strength of Bulgaria is estimated at nearly 210,000 men, including 6 regiments of cavalry, 6 regiments of field artillery, and 3 battalions of garrison artillery. The navy of Bulgaria consists of a few steamships of from 400 to 800 tons, one torpedo gunboat, two armored gunboats used for the defense of the Danube, and several small steamboats. See ARMIES and NAVIES.

The Bulgarians, who constitute the bulk of the population of Bulgaria, are a different people from the ancient Bulgars who settled in the region twelve centuries ago (see paragraph on HISTORY). Linguistically, they constitute a branch of the South Slavic stock (see BULGARIAN LANGUAGE). They may now be termed an ethnic group, made up of Slavic (Teuto-Slavic), Gothic (Teutonic), and Mongoloid (Finno-Tatar) elements, to which Mussulman and Greek have added a considerable percentage. The Bulgarian nationality numbers about 4,000,000 souls, of whom about three-eighths live outside of Bulgaria—in Turkey, Russia, Rumania, and Austria-Hungary. The bulk of them belong to the Greek Church; but there are several hundred thousand Mohammedan Bulgarians, called Pomaks, who are found mainly in the Rhodope Mountains, in Turkish territory.

The population of Bulgaria, including that of Eastern Rumelia, was 3,310,713 at the census of 1893, and 3,733,189 at the census of 1900. Racially the population was divided in 1893 into 2,505,326 Bulgarians, 569,728 Turks, 62,628 Rumanians, 58,518 Greeks, 52,132 gypsies, 27,531 Spanish Jews, 16,290 Tartars, and 18,560 consisting mostly of foreigners from European countries. The Constitution of Bulgaria guarantees religious freedom; but the Greek Orthodox is recognized as the National Church, and numbers among its adherents by far the largest part of the population, including the royal family. The clergy of both the national and the other churches are paid by the State. Next to the Greek Orthodox Church, with 78.7 per cent. of the population, the Mohammedan has the largest number of adherents—19.4 per cent.

HISTORY. Modern Bulgaria includes the greater part of the Roman Province of Mœsia

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and a portion of Thrace. At the time of the great migration of nations which overwhelmed the Roman Empire of the West, the Slavs pressed forward into this region, pushing aside the Germanic invaders who had preceded them. About the close of the Fifth Century A.D. the Bulgars, a people of Finnic stock, probably akin to the Huns, whose early home appears to have been the steppes of southeastern Russia, begin to make their appearance in the region of the Lower Danube, and in the reign of Justinian (527-65) they figure among the enemies of the Byzantine Empire. Toward the close of the Seventh Century they pushed across the Danube and occupied Lower Mœsia, where they erected a strong and warlike State, which narrowed the boundaries of the Byzantine Empire, and for a time even threatened its existence. About 862 their khan was converted to Christianity. Not being numerically powerful enough to attack the Slavic and other elements in the region which they had occupied, the Bulgarians gradually became merged in the subjected population, and a Slav Bulgarian people were evolved out of the admixture. The Bulgarians borrowed much from their Greek neighbors. The Bulgarian realm attained a high pitch of power at the beginning of the Tenth Century under Symeon, who assumed the title of Czar, and whose dominions extended to the Adriatic. Soon after a disruption of the realm into two parts took place. The eastern half was conquered by the Byzantine Emperor, John Zimisces, and the western succumbed in 1018 to the arms of the Emperor Basil II. In 1186 the Bulgarians, under the lead of John Asen, revolted against the Byzantine rule, and established a new realm, the capital of which was Tirnova. This soon rose to be a powerful State; but after a time it was outstripped by Servia, which in the middle of the Fourteenth Century was the great Slavic power of the South. In 1354 the Ottoman Turks first obtained a foothold in Europe, and their conquest of Adrianople in 1361 brought them close to the frontiers of Bulgaria. In 1388-93, under Amurath I. and Bajazet I., they overran and conquered the country. The prostrate nation ceased to have a history of its own until the latter half of the Nineteenth Century. In 1876 a slight revolt broke out among the Bulgarians against the intolerable oppression and misrule of the Ottoman Government. Its immediate occasion was the settlement among the peaceful peasantry of Circassians, who made the native population the victims of brutal barbarity. The Bashi-Bazuks, an irregular police enrolled by the Turkish commander to put down the revolt, were largely composed of these alien colonists, and the suppression of the rebellion was accompanied by the most horrible outrages. The 'Bulgarian atrocities' shocked the civilized world, and gave Russia the excuse she had been seeking for declaring war on Turkey. Bulgaria was the principal theatre of the war of 1877-78. (See RUSSO-TURKISH WAR.) Russia hoped to bring all of the Slav peoples of the Balkans under her hegemony; and, by the Treaty of San Stefano, Bulgaria was made an autonomous principality tributary to Turkey, with boundaries wider than those of the ancient kingdom and a coast-line on the Ægean. The Powers, at the Congress of Berlin (1878), refused to allow such a great curtailment of the Turkish territory, but made Bulgaria north of the Balkans an autonomous principality, tributary to Turkey, with a prince to be elected by the people, subject to the confirmation of the Porte with the assent of the Powers. The Province of Eastern Rumelia, to be administered by a Christian Governor, was erected south of the Balkans, out of part of the territory which the treaty of San Stefano had included in Bulgaria. (See SAN STEFANO, TREATY OF, and BERLIN, CONGRESS OF.) Alexander of Battenberg (q.v.) was the first Prince of Bulgaria under this settlement. An outburst of Bulgarian national spirit brought about in 1885 a revolution, by which Eastern Rumelia united itself to Bulgaria. The protest of the Porte received no encouragement from the Powers. Russia alone opposed the union, because of what it regarded as the ungrateful spirit of independence shown by the Bulgarian people, who had taken up the problems of their newly recovered national life with an unexpected spirit and vigor. The bitter struggle between the Russian Party and the Nationalists has since complicated the political life of the principality. Another opponent of the aggrandizement of Bulgaria was found in her neighbor and ancient rival, Servia, which put an army into the field to oppose the union by force. In a short and sharp campaign in the closing months of 1885, Prince Alexander and the Bulgarian troops defeated the larger Servian army, and were only restrained from invading Servia by the intervention of Austria-Hungary. Prince Alexander, after a shameful conspiracy against him excited by Russian intrigues, abdicated the crown in September, 1886, in the hope that it would lead to a more friendly attitude on the part of Russia, and Prince Ferdinand of Coburg was chosen to succeed him in July, 1887. Russia, which had opposed the election of Prince Ferdinand, withheld its recognition of his title to the throne, as did the other great Powers. Nevertheless, Ferdinand maintained himself in his position, owing mainly to the ability of his Premier, Stambuloff. The fall and subsequent assassination of Stambuloff (July, 1895) paved the way for a better understanding with Russia: and when Ferdinand consented to have his son Boris, received into the Greek Church (February 14, 1896), Czar Nicholas II. formally acknowledged Ferdinand as Prince of Bulgaria. This step was followed by the recognition of Ferdinand on the part of the other European Powers. Ferdinand's son has been confirmed by the Sobranje, or National Assembly, as heir to the title. Bulgaria's hereditary hostility toward Greece, enhanced by their common desire for the possession of Macedonia, and the jealousy between Bulgaria and Servia, stand in the way of that Balkan unity which has been so much discussed. Bulgaria is known as the 'Peasant State,' and is not wealthy; but it has, in the years of its practical independence, developed politically, economically, and intellectually, in a way that has surprised both its friends and its enemies. See POLITICAL PARTIES, BULGARIAN.

BIBLIOGRAPHY. For a general description, consult: Kanitz, *Donaubulgarien und der Balkan* (Leipzig, 1882); Tuma, *Die östliche Balkanhalbinsel, militär geographisch, statistisch und kriegshistorisch dargestellt* (Vienna, 1886); Samuelson, *Bulgaria, Past and Present* (London, 1888)—perhaps the best comprehensive account

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to that date in English; Jirecek, *Das Fürstentum Bulgarien* (Vienna, 1891). For the most authoritative history of Bulgaria for the period up to 1876, consult: Jirecek, *Geschichte der Bulgaren* (Prague, 1876). For the later history: Huhn, *The Struggle of the Bulgarians for National Independence Under Prince Alexander*, translation (London, 1886); id., *The Kidnapping of Prince Alexander of Battenberg*, translation (London, 1887); Koch, *Prince Alexander of Battenberg* (London, 1887). Consult also: Battenberg, *Die volkswirtschaftliche Entwicklung Bulgariens von 1879 bis zur Gegenwart* (Leipzig, 1891); Drandar, *Les événements politiques en Bulgarie depuis 1876 jusqu'à nos jours* (Brussels, 1896); Beaman, *Twenty Years in the Near East* (London, 1898); Strauss, *Die Bulgaren* (Leipzig, 1898); Falkenegg, *Aus Bulgariens Vergangenheit und Gegenwart* (Berlin, 1900); Dicey, *The Peasant State* (London, 1894); Miller, *The Balkans—Rumania, Bulgaria, Servia, and Montenegro* (New York, 1896); and *Travels and Politics in the Near East* (1899); MacGahan, *The Turkish Atrocities in Bulgaria* (London, 1876); Gladstone, *The Bulgarian Horrors and the Eastern Question* (London, 1876).

BULGA'RIAN LANGUAGE. A language spoken by nearly 5,000,000 people and belonging, with the Church Slavonic, Serbian, and Slovenian, to the southern group of Slavic languages (q.v.). Although it stands with the other languages that do not possess the so-called *Voll-laut*, it shares with the Russian its absence of syllabic quantity and possesses a peculiar accent of its own. The ancient nasals have become obscure, indefinite sounds. Most striking in morphology is the post-positive use of the article at the end of the noun. Of declension in modern Bulgarian there is but little, the adjectives having lost their degrees of comparison; in conjugation only the present tense remains, all the other forms being periphrastic. Lexically it shows that it has been much influenced by the Turkish, Albanian, Serbian, and Rumanian languages. In reality there is no Pan-Bulgarian language as such. There is a great variety of dialects, which fall into three groups—Southern Thracian, Rhodopian, and Western Macedonian. The written language used in antiquity was the Church Slavonic or a dialect closely resembling it, and known as 'Old Bulgarian.' The 'Middle Bulgarian' dates from the Twelfth Century. The Turkish yoke brought a long interruption in the development of the language, which lasted until nearly the Nineteenth Century. Some of the modern writers have used the Church Slavonic forms, while others have preferred the popular speech. Of late the majority of writers have been inclined to favor the Danubian dialect for literary purposes. The Cyrillic alphabet is used and the system of spelling has been modeled on the phonetic Serbian spelling of Karajich. The best grammar is that of Kyriak Cankof (Vienna, 1852), and the best dictionaries are those of Bogoroff, Bulgarian-French and French-Bulgarian (Vienna, 1869), and Duvernois, Russian-Bulgarian (Moscow, 1885-89). A German-Bulgarian dictionary has been published by Miladinow (Sofia, 1897).

BULGARIAN POLITICAL PARTIES. See POLITICAL PARTIES. BULGARIAN.

BULGARIN, bōōl-gä'rĭn, FADDEI VENEDIKTOVITCH (1789-1859). A Russian author, born in Lithuania. He fought in the campaign against France, but afterwards served in the Polish army under Napoleon. On Napoleon's fall he returned to Saint Petersburg (1820) and devoted himself to literature, attracting considerable attention by the biting sarcasm of his articles in his daily, the *Northern Bee*, founded in 1825. He was a servile follower of the Absolutist régime. Through his intimacy with the members of the secret police he was enabled to do much harm to his numerous opponents. Some of Pushkin's bitterest epigrams have given Bulgarin a notoriety more lasting than the fame of his own literary efforts. Of these, *Ivan Vyzhigin: or, the Russian Gil Blas* (1829), with its sequel, *Peter Ivanovitch Vyzhigin* (1831), *Dmitriy* (1830), and *Mazeppa* (1834), were much in vogue in their time. In 1837 he published under his own name the work of N. A. Ivanoff, professor at Dorpat, *Russia in Her Historical, Statistical, Geographical, and Literary Aspects* (6 vols., Saint Petersburg).

BULGARIS, bōōl-gä'rēs, DEMETRIUS (1803-78). A Greek statesman, born at Hydra. He fought in the Greek War of Independence, and in 1831 was one of the opponents of Cape d'Istria, and upon the downfall of the latter conducted the Ministry of Marine. He resigned his position upon the arrival of King Otho, but after the revolutionary movement of 1843 resumed his political activity as a member of the Senate. In 1847 he became Minister of Marine, in 1848 Minister of Finance, and after the Crimean War he was appointed president of the Cabinet, in which capacity he restored order and conciliated the Powers. Afterwards he became one of the foremost opponents of the Bavarian dynasty in the Senate. Upon the outbreak of the Revolution of 1862, Bulgaris was proclaimed co-regent with Rufos and Canaris, but was deposed by Canaris in 1863. He served as president of the Ministry in 1863-64, 1865, 1866, 1868, 1871, 1874.

BULGARIS, EUGENIOS (1716-1806). A Neo-Greek educator and theologian. He was a teacher at Janina (after 1750), and director of the academy on Mount Athos from 1753 to 1758, when he was compelled to resign owing to Turkish intrigues. After conducting a similar academy in Constantinople for two years, he was again compelled to renounce his position, and went to Berlin. Here Frederick the Great gave him a letter of introduction to Catharine II. of Russia, who appointed him Archbishop of Slovensk and Kherson. He prepared several valuable text-books in metaphysics and logic, made notable contributions to the theological literature of his country, and by his translations brought to the attention of the Greeks some of the best examples of European literature. His style was long accepted as a model, and his range of subjects was extensive. Among his original Greek works are the following: *Opinions of Philosophers* (1804); *The First Century of Church History* (1805); *Treatise on Tolerance* (1768).

BUL'GARS, or **BULGARIANS.** An ancient people of Finnic stock, probably akin to the Huns. They first appear in history about the close of the Fifth Century A.D., at which time a part of the nation, advancing westward from the steppes of southern Russia, made its appearance in the region about the mouth of the

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Danube. Two centuries later they took possession of Lower Mœsia, south of the Danube, to which country they gave their name. The descendants of these invaders became Slavicized (see BULGARIA, paragraph on *History*). The part of the nation which had remained behind in their old home in the Russian steppes founded a realm known as that of the Volga Bulgars. These northern Bulgars embraced Islam. The ruins of their old capital, Bulgar or Bolgara, may be seen near the village of Bolgary in the Russian Government of Kazan. See BOLGARY.

BULGA'RUS. The most celebrated of the famous 'four doctors' of the law school of Bologna. He was a native of that city, and was regarded as the Chrysostom of the gloss-writers. He lived to a great age, becoming childish before his death in 1166. Bulgarus was one of the most trusted advisers of the Emperor Frederick I. The commentary *De Regulis Iuris* is his most celebrated work. It was edited by F. G. C. Bechhaus (Bonn, 1856).

BULHÃO-PATO, bōō-lyoun' pä'tô, RAIMUNDO ANTONIO DE (1829—). A Portuguese poet, born in Bilbao. At the age of 9 he was taken to Lisbon. He is a pupil of Garrett and Herculano, and a pronounced exponent of the Romantic School. He became a member of the Academy of Sciences, and, as chairman of the commission intrusted by that body with the publication of the *Monumentos ineditos*, he edited the *Cartas de Affonso de Albuquerque* (Lisbon, 1884). His independent works include the following: *Versos* (1850 and 1857); *Paquita*, a narrative poem (1866); *Cancões da Tarde* (1867); *Flores agrestes* (1870); *Cantos e satiras* (1873).

BULIM'IA (Neo-Lat., from Gk. βοῦς, *bous*, ox + λιμός, *limos*, hunger). A term applied to the rapacious appetite manifested by the insane. It is a condition of frequent occurrence in cases of general paresis (q.v.), less often in cases of mania (q.v.). It is partly of direct psychical origin, partly due to atony and anæsthesia of the stomach.

BULI'MUS. A genus of land-snails (see SNAIL), having an elongated spiral shell with a thickened reflected lip, and often handsomely ornamented. Most of the 300 or more species are tropical, and belong to South America, where they are found mainly on trees and bushes. "Most of the species are large, some being among the giants of the pulmonates, only exceeded by the Achatinæ. (See AGATE-SHELL.) The largest species is *Bulimus ovatus*, which is common in the forests of southern Brazil; the shell reaches a length of six inches. This species is an article of food, and is sold in the markets of Rio Janeiro. Its eggs are also very large; they have a white calcareous shell and equal in size those of a pigeon." Several species occur along the southern border of the United States. See Colored Plate of SNAILS, Figs. 24 and 27.

BULKELEY, MORGAN GARDNER (1837—). An American financier and politician. He was born in East Haddam, Conn., was educated in Hartford, and became a merchant in Brooklyn, N. Y. In 1872 he returned to Hartford, and was president of the United States Bank until 1879, when he accepted the presidency of the Ætna Life Insurance Company. He was Mayor of Hartford for four years (1880-88), and in 1889 became Governor of Connecticut. At the election in 1891 no candidate received a constitutional majority, so that Governor Bulkeley, though not a candidate, continued to act as the executive until 1893.

BULKELEY, PETER (1583-1659). An American colonist, the founder of and first minister of Concord, Mass. He was born in Bedfordshire, England, the son of a Non-Conformist minister; was educated at Saint John's College, Cambridge, where he was for some time a fellow, and for twenty-one years was rector of a parish in Bedfordshire. To secure greater freedom of worship, he emigrated to America in 1635 and settled at Cambridge, Mass. In the same year "he carried a good number of planters with him up further into the woods" (Mather's *Magnalia*, I., 400), and founded Concord, where he remained as 'teacher' and pastor until his death. He was a profound theologian, was a good classical scholar, and, according to Cotton Mather, had throughout life "a competently good stroke at Latin poetry" (*Magnalia*, I., 403). He wrote some English verse, including an elegy of Thomas Hooker (published in Morton's *New England Memoriall*), and a learned theological work entitled *The Gospel Covenant; or, the Covenant of Grace Opened* (1646)—"one of those massive, exhaustive, ponderous treatises," says Tyler, "into which Puritan theologians put their enormous biblical learning, their acumen, their industry, the fervor, pathos, and consecration of their lives" (Tyler, *History of American Literature*, New York, 1878). Consult an interesting sketch in Mather's *Magnalia* (London, 1702), and an article, "Life and Times of Rev. Peter Bulkeley," in the *New England Historical and Genealogical Register*, Vol. XXXI. (Boston, 1877).

BULKHEAD (*bulk* or *balk*, Ger. *Balke*, beam, bar). The name given to a variety of constructions in civil and marine engineering. In tunneling a bulkhead is a vertical partition of timber or masonry intended to prevent the passage of water, air, or mud. Tunnel bulkheads may be made solid or they may be provided with a door to give passage to workmen and materials. In harbor work the term bulkhead is often applied to the sea-wall which marks the shore-line, and from which the piers or quays project out into the water.

On shipboard a bulkhead is a partition separating the compartments of a ship. In modern vessels bulkheads are chiefly of steel, like the rest of the hull. All vessels are now divided into several compartments by water-tight bulkheads as a matter of safety, so that the breaching and consequent filling of one compartment with water need not necessarily cause the ship to founder. Water-tight bulkheads are both transverse and longitudinal, the former dividing the ship into several great compartments, and the latter subdividing these. In addition to the main bulkheads, many parts of war-ships, like magazines, shell-rooms, etc., are especially inclosed. In merchant vessels the principal transverse bulkheads are without any holes through them below the water line; but in men-of-war the necessity for communication below has necessitated the cutting of doors which are designed to be water-tight, but many of them are probably not wholly so. In ships having two or three screws, the engines for each are in separate compartments, the boilers are placed in one or more compart-

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ments, and the coal-bunkers are divided into several. In most merchant vessels a *collision bulkhead* is fitted a short distance from the stem, and several steamers have been saved by it from foundering.

BULKLEY, L. DUNCAN (1845—). An American physician. He was born in New York and was educated at Yale (1866), and at the College of Physicians and Surgeons, New York (1869), and afterwards took a supplementary course in dermatology abroad. In 1901 he was attending physician at the New York Skin and Cancer Hospital, at the Hospital for Ruptured and Crippled, and at the Manhattan Eye and Ear Hospital. He was also consulting physician at the New York Hospital, and dermatologist at the hospital on Randall's Island. The following are some of his principal publications: *Analysis of Eight Thousand Cases of Skin Disease* (1882); *Acne and its Treatment* (1885); *Syphilis in the Innocent* (1894); *Manual of Diseases of the Skin* (1898); *Eczema and its Treatment* (1901).

BULL (Lat. *bulla*, anything round or swelling, a boss, knob). Originally the name of the capsule of the seal appended to letters, afterwards to the whole seal, and later to the document itself; in its earlier use sometimes applied to documents issued by the emperors, as in the case of the celebrated Golden Bull (q.v.) of the Emperor Charles IV., 1356, the Byzantine and early Frank emperors being accustomed to use a golden seal. The name is now applied exclusively to documents put forth in the name of the Pope. They are issued by the apostolic chancery, and differ in several particulars from briefs. (See BRIEF.) In cases of granting favors, the seal is appended to the open letter by a yellow or red silk cord; but in the administration of justice a gray cord is used. The Gothic character was used for bulls as distinguished from briefs down to 1878, when Leo XIII. ordered the use of the ordinary character. At the same time he restricted the use of the very ancient leaden seal previously employed to the more important bulls, replacing it for other cases by a simple red one stamped on the parchment. All bulls begin with the name of the Pope, followed by the title *Servus servorum Dei*. The greeting is followed by a general introduction, the first words of which are usually adopted to designate the bull; for example, the bull *Exsurge Domine*, issued by Pope Leo X. and burned by Luther; *In Cena Domini*, the celebrated declaration against heretics, first issued by Urban V. in 1362; the famous *Unigenitus*, which condemned Quesnel in 1713; *Dominus ac Redemptor noster*, which abolished the Jesuits, and *Sollicitudo omnium*, which restored them; *Ineffabilis*, which proclaimed the doctrine of the Immaculate Conception in 1854; and *Pastor æternus*, which defined the Papal infallibility in 1870. The fullest collection of Papal bulls is that begun by Coquelines (1733-42) and continued by Barberi and Gaude.

BULL. A ludicrous and unintentional blunder in speech due to the conjunction of contradictory or incompatible ideas. Some would trace the origin of the term to the Papal bulls, in which the Pope styles himself 'the servant of servants,' but claims absolute authority over the world. The following aphorism, ascribed to a soldier who had run away, is a good illustration of a bull: "Well, it's better to be a coward for a few hours than to be dead all the rest of your life!" The Irish are noted for their bulls. Consult Edgeworth, *An Essay on Irish Bulls* (London, 1802). See ROCHE, SIR BOYLE.

BULL. See OX.

BULL, CHARLES STEDMAN (1846—). An American physician, born in New York City and educated at Columbia University and at the College of Physicians and Surgeons (1868). He was house physician and surgeon at Bellevue Hospital for eighteen months, and then went abroad, where he studied for two years in Vienna, Heidelberg, Berlin, Utrecht, Paris, and London; and was a pupil of Von Arlt, Graefe, and Donders. He is professor of ophthalmology in Cornell University Medical College and consulting ophthalmic surgeon to the Presbyterian, Saint Luke's, and Saint Mary's hospitals, New York. Dr. Bull is ranked among the greatest living oculists. He is the author of a large number of medical works, among which are the following: *Choroiditis Following Cerebro-Spinal Meningitis* (1873); *Influence of the Fifth Nerve in Iritis and Choroiditis* (1876); *Symptomatology and Pathology of Intracranial Tumors* (1875). He edited the third and fourth editions of J. Soelberg Wells's *Treatise on Diseases of the Eye*, to which subject he has also contributed numerous original papers.

BULL, GEORGE (1634-1710). An English bishop and theological writer. He was born at Wells and studied at Oxford, whence he retired in 1649, having refused to take the Commonwealth oath imposed by Parliament. He received holy orders when 21 years old, and was appointed pastor of Saint George's, Bristol; later he had the two parishes of Suddington Saint Mary's and Suddington Saint Peter's. In 1669 he published his *Harmonia Apostolica*, the object of which was to reconcile the apostles Paul and James on the subject of justification. His work occasioned considerable controversy among clergymen, and in answer to criticisms Bull published, in 1675, his *Examen Censuræ* and *Apologia pro Harmonia*. In 1678 he was presented to a prebend in Gloucester Cathedral, and made rector of Avening, Gloucestershire. In 1679 he was installed Archdeacon of Llandaff, and received the degree of D.D. from Oxford University. In 1685, to vindicate himself from the charge of Socinianism, he published his *Defensio Fidei Nicænæ*, in which he gives the testimony of the anti-Nicene fathers on the doctrine of the Trinity. This was supplemented in 1694 by his *Judicium Ecclesiæ Catholicæ*, for which the thanks of the whole French clergy were sent to him through the celebrated Bossuet. His last work, also on the Trinitarian controversy, was *Primitiva et Apostolica Traditio*. In reply to Bossuet, who had expressed wonder that Dr. Bull remained separated from the Church of Rome, he published *The Corruptions of the Church of Rome* (1705-07). He was consecrated Bishop of Saint David's in 1705. A complete edition of his works, including his sermons and his life by Robert Nelson, was published at the Clarendon Press (Oxford, 1827).

BULL, GOLDEN. See GOLDEN BULL.

BULL, JOHN. A popular synonym for the English people. Arbuthnot first gave it literary currency in his *History of John Bull* (1712), a political allegory intended to satirize the Duke of Marlborough, and to increase feeling against

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the war with France. John Bull is well known in current comic periodicals as a burly country squire, impetuous, honest, narrow-minded, dogmatic, and easily imposed upon. This figure was first gradually evolved in the pages of *Punch*.

BULL, JOHN (c.1563-1628). An English organist and composer. He was appointed organist in the Chapel Royal in 1591, and next year was made doctor of music by Oxford University. On the foundation of Gresham College he was appointed first lecturer in music. Later he went to Belgium and became organist to the cathedral in Antwerp, where he died. The claim that he composed the English national anthem has not been sustained.

BULL, OLE BORNEMANN (1810-80). A remarkable Norwegian violin virtuoso. He was born in Bergen. He showed remarkable musical precocity. In the mountains he fiddled away for hours and hours, as his father would not tolerate the instrument in his house. At 18 he appeared at a concert and aroused extraordinary enthusiasm. He broke with his parents and went to Cassel (1892) to study under Spohr (q.v.), but was so coldly received that he decided to forsake music, and turned to jurisprudence in Göttingen. Soon, however, he returned to Bergen and practiced assiduously at his instrument until 1831. Cholera was then raging in Paris, and Bull, who went there to give a concert, had to delay his appearance from month to month. His savings were consumed, he fell ill, and thieves stole all his belongings, including his violin. In despair he threw himself into the Seine, but was saved, and a wealthy woman, Villeminot, who took a great interest in him, provided him with necessary comfort and a Guarneri instrument. His début (1833) was a triumph, Paganini being in the audience. A hearing of this master caused Bull to cultivate the Paganini method. His subsequent appearances were equally successful, but Italy received him coldly. Only in Florence, when acting as substitute for Bériot, he shared the honors with Malibran. Similar ovations were accorded him in Naples, where he was ranked with Paganini. With undiminished success he played throughout Germany, France, Russia, England, and Ireland, but in 1839-40 fortune turned against him. Molique overshadowed him in Paris; London and Germany were equally unkind. Disheartened, he went into retirement (1840-43), and then proceeded to America, where he won enthusiastic recognition. With the money earned here he returned to Norway, and built a national theatre in Bergen, but soon quarreled with the authorities and again went to the United States (1852). He amassed a fortune, bought 125,000 acres of land in Pennsylvania, and founded a Norwegian colony, but was swindled out of his possessions and money, and in 1860 recrossed the Atlantic. His European tour in 1865-66 brought little money and evoked scant enthusiasm, for Europe had adopted new standards of violin-playing. Subsequently he established a violin school of his own, and repaired his fortune by several visits to the United States (1868-69, 1870-79), where he married. He bought a house in Cambridge, Mass., and during the last years of his life spent much of his time there. He died at his summer residence near Bergen, Norway. Bull was a rare phenomenon in the history of music. His tone was mellow and powerful; in the matter of mere technique he excelled even Paganini, and probably never had his equal; all the difficulties of the violin, double and even quadruple stopping, were as mere child's play to him. And yet a critic could discern the self-taught musician behind this prodigious technique. As a matter of course, he particularly excelled in compositions, putting the player's nimbleness of fingers to a severe test; yet Joachim says of him: "No artist in our time has possessed Ole Bull's poetic power; no one has ever surpassed his playing of the adagio." Of all the masters, he preferred to interpret the works of Mozart; but his own compositions (chiefly fantasias on national themes, which he invested with a peculiar fire of his own) best exhibited his mastery over his instrument, and were the favorites with his audiences. As contributions to the literature of the violin they are of little value; snatches of genuine inspiration occur here and there, but otherwise they are but clever showpieces. Consult: Sara C. Bull, *Ole Bull: A Memoir* (Boston, 1883); and a biography in Norwegian by O. Vik (Bergen, 1890).

BUL'LA (Lat., boss, knob). A collection of serous fluid, situated immediately beneath the cuticle, and separating the latter from the true skin. Bullæ differ from vesicles only in size, and no very definite line can be drawn between a large vesicle and a small bulla. Bullæ usually vary in diameter from a quarter of an inch to two inches. They may be followed by crusts or by ulcerations. See BLEB.

BULLACE, bụl'lâs (Gael. *bulaistear*, bullace, sloe). A shrub or small tree (*Prunus insititia*), larger and much less spiny than the sloe (*Prunus spinosa*), but very closely allied to it, as it is also to the plum, so that many botanists regard them all as one species, an opinion confirmed by the circumstance that the varieties pass into each other by imperceptible gradations. The bullace may be regarded as a form intermediate between the plum and the sloe. Its leaves, however, are generally broader in proportion to their length than those of either of these, and its fruit-stalks more frequently in pairs; it differs also from both of them in its downy fruit-stalks, and in having the under side of its leaves permanently downy. The flowers are rather larger than even those of the plum; the fruit is larger than the sloe, is generally globose, and although it partakes in some degree both of the acidity and the roughness of the sloe, it is not unpleasant, especially after having been mellowed by frosts, and it makes excellent pies or tarts. The bullace is common in hedges, coppices, and banks in England and in many parts of Europe, but is rare in America.

BULLANT, bụ'läN', JEAN (1575-78). A French architect. He began his reproduction of the classic style at the Château of Ecouen (c.1550), and was then appointed supervisor of the royal buildings (1557), and worked on the Petit Château of Chantilly. As a designer of sculpture his masterpiece is the monument of the Montmorencys. He was architect of the Tuileries in 1570, after Philibert de l'Orme, and built the famous Hôtel de Soissons for Catherine de' Medici (1572). He also wrote on architecture.

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BULL-BAITING. A barbarous sport, once popular in England among all classes of society, but declared illegal in 1835. It consisted in causing a bull to be attacked by dogs, and to increase the fury of the bull his nose was sometimes blown full of pepper. Another form of the sport was to fasten the bull to a stake by a long rope, and to set bulldogs at him, one at a time, which were trained to seize him by the nose, an act called *pinning* the bull. The spectators especially appreciated the success of the bull, when, lowering his head, he caught the dog on his horns and tossed him to a great distance. In some places bull-baiting took place regularly as an annual event, and funds were sometimes left to provide for it. King James I. delighted in this sport. When, as a prince, the Czar Nicholas I. of Russia visited England in 1816, he attended a boxing-match and a bull-baiting, which were organized as samples of English sport.

An equally barbarous sport, termed *bull-running*, was formerly practiced at Stamford and Tutbury, where men and women maddened the bull with hideous noise, and then pursued and beat him with 'bull clubs' till he expired.

BULLBAT (so called from the noise it makes and its flying mostly at dusk). A local name of the night-hawk (q.v.).

BULLCALF. A recruit in Falstaff's 'ragged regiment,' in Shakespeare's *Henry IV.*, Part II. He appears in act iii., scene 2, and is described as 'a diseased man.'

BULLDOG (for origin of name see below). A kind of dog which has existed as a distinct race in England for many centuries. It is regarded as a variety of the mastiff, or a cross between the mastiff and some other breed, and seems to have originated in a variety of great courage and tenacity developed in boar-hunting. Short-eared mastiffs, called 'alaunts' (*Alan* of heraldry), were so used in early English boar-hunting; and modern bulldogs seem to have been developed out of them by the sport of baiting animals so prevalent from Norman times to the Eighteenth Century. The worrying of a bull in particular required a dog of ferocious courage, considerable weight, the instinctive habit of seizing the enemy by the nose, and indomitable strength and tenacity of jaw. These requirements were perfected by breeding, and the modern bulldog, which began to be recognized and cultivated early in the Seventeenth Century, is the result.

Modern standards call for a dog of the form shown in the plate of DOGS, weighing about 50 pounds. He must have a compact, thick-set, low-swung body, short and strong in the back, where the loins should be slightly elevated above the line of the withers upon muscular hind legs. The very wide shoulders and sturdy fore limbs characteristic of the breed must not be caricatured into uselessness, as is sometimes done; the dog must be able to walk any reasonable distance without exhaustion. The very large head, in circumference before the ears equal to the dog's height, must have an extremely short, heavily wrinkled face, forming at the throat a dewlap in two loose folds; the teeth should show, and the eyes be round and dark, and the ears be of the 'rose' form—never erect. The small breeds, called toy bulldogs, must conform to the model. Colors are various, but solid black undesirable. Red or some other pure brindle is at present preferred, and next to that solid white, red, fawn, or piebald.

These dogs were reared after the extinction of bull-baiting mainly for fighting in dog-pits, but latterly they have been largely bred and variously modified as watch-dogs and as pets, and their dispositions have been found no less faithful and kindly than in the case of many other dogs gently treated. See MASTIFF.

The *French bulldog* is a small, compact breed of terrier form and pug-like face, having high, erect, bat-like ears. It originated in Brussels, became fashionable as a pet in France, and first appeared at American shows in 1896, and has rapidly become popular as an interesting little house-dog of good disposition.

BULLE, bul'le, KONSTANTIN (1844—). A German historian. He was born at Minden, Westphalia, and studied philology, theology, and history at the Universities of Jena and Bonn. He is the author of the following important works: *Geschichte der neuesten Zeit 1815-85* (1887); *Geschichte der Jahre 1771-77*, a continuation of Becker's *Weltgeschichte* (1878); *Geschichte des zweiten Kaiserreichs und des Königreichs Italien*, in Oncken's *Allgemeine Geschichte* (1890).

BULLEN, bul'lĕn, FRANK THOMAS (1857—). An English author and lecturer, born at Paddington, London. After meagre schooling, and a three-years' experience as errand-boy and gamin, he went to sea. He continued afloat until 1883, and rose from able-bodied seaman to chief mate. In 1883-99 he was junior clerk in the British meteorological office. His varied experiences on board ship throughout the globe afforded him material for what many critics have regarded as the most noteworthy contribution made by an Englishman to sea literature since the days of Marryat. Of his books the earliest, *The Cruise of the 'Cachalot'* (1898), is the best known. Others are, *The Log of a Sea Waif* (1899); *A Sack of Shakings* (1901); and *Deep-Sea Plunderings* (1901).

BULLER, bul'lĕr, Sir REDVERS HENRY (1839—). A British military officer. He fought through the Ashantee, Kaffir, and Zulu campaigns, winning the Victoria Cross in the last for the gallant rescue of three comrades. Later he served in the Boer War of 1881; in the Egyptian War of 1882; and in the Sudan Campaign of 1884-85, and received the K.C.B. in 1885. From 1887 to 1890 he was quartermaster-general, and in the latter year became adjutant-general. He was promoted to be lieutenant-general in 1891, and received the G.C.B. in 1894. In 1898 he was placed in command of the First Army Corps and the garrison of Aldershot, and in November, 1899, succeeded to the supreme command of the British forces in South Africa. Great things were expected of him there, for he had been regarded as one of the most active and indomitable fighting generals in the British Army; but he suffered several serious reverses about Ladysmith, and was superseded by General Roberts and returned to Aldershot. In consequence of an ill-advised speech in London, soon after his return, he was retired. The unwise championship of friends also brought out facts regarding his South African leadership. The Secretary for War made public through the regular parliamentary channels the fact that General Buller, after his first reverse, had advised by heliograph message that General White, the

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heroic defender of Ladysmith, abandon the siege and surrender his troops to the enemy, advice which the latter refused to adopt under any circumstances. The Secretary for War, in commenting on the incident, said that had this been carried out, it would have been the "most calamitous reverse in English military history." With the publication of these official documents and statements was swept away the last vestige of Buller's reputation as a war commander.

BULLET (Fr. *boulette*, dim. of OF. *boule*, ball, from Lat. *bulla*, knob, boss). The projectile discharged from a rifle, pistol, machine-gun, or similar weapon. For military purposes, in its spherical form, it is practically obsolete, its place being taken by various forms of elongated projectiles. The small-bore bullets of modern rifles have a pressed leaden core, and a covering or thin envelope of steel, copper, or nickel, and are gradually becoming longer in length. The copper-coated bullet is generally condemned because of its poisonous character. Formerly bullets were placed in the firearm independent of the powder; both are now contained together in the cartridge. See AMMUNITION; CARTRIDGE; PROJECTILES; and SMALL ARMS.

BULL-FIGHT. A combat of men with bulls, for the entertainment of the public. They were common in Greece, particularly in Thessaly, and at one time in Rome under the emperors. They are still a favorite pastime in Spain and Mexico, and, in a modified and more merciful form, in Portugal. In Spain they were abolished by Charles IV.; but Joseph, Napoleon's brother, reëstablished them out of policy, the mass of the Spanish population being passionately fond of the sport. The most magnificent bull-fights were at one time instituted by the monarchs themselves; at present, both in the capital and in the larger towns of Spain, they are held either as private speculations or for the benefit of public institutions. In Madrid, during the bull-fighting season, there is at least one afternoon in every week devoted to the sport. The fights take place in a kind of open-air circus, called the *Plaza de Toros*, round which the seats rise one above another, with a tier of boxes over them. The *Plaza* is capable of containing from 10,000 to 12,000 people. The best Andalusian bulls are bred at Utrera, the best Castilian ones on the Jarama, near Aranjuez. The latter are the breed usually ployed in Madrid. The bull-fight has been described as a tragedy in three acts. The principal performers in the first are the *picadores* or horsemen; in the second, the *banderilleros*, or footmen, are the actors; the third act devolves on the *matador*, or swordsman. The *picadores*, dressed in picturesque Spanish costume, and armed with a lance, take up their position in the middle of the circus, opposite the bull-stalls. The *banderilleros*, gay with ribbons and bright-colored cloaks, distribute themselves in the space between the barriers. The *matador*, or chief combatant, is also on foot. He is, during the preliminary parade, handsomely dressed, but when he enters the ring for business he has doffed his expensive trappings, and holds in the right hand a naked sword, in the left the *muleta*, a small stick, with a scarlet-colored silk attached. On a sign given by the chief magistrate, a bull is let out from the stalls; the *picadores* stand ready in the arena, lance in hand, awaiting his charge. With a brave bull, they find all their skill requisite in acting on the defensive; with a cowardly one, they act on the offensive, and should their stabs be ineffectual in rousing the animal to the requisite fury, the poor beast is hooted by the crowd, and ultimately stabbed ingloriously in the spine. Whenever a horse is wounded, the rider betakes himself to flight; and when either the above casualty happens or a *picador* is thrown, the *banderilleros* rush in, and attract the bull by their cloaks, saving themselves, if need be, by leaping over the palisade which incloses the circus. When the bull begins to flag, the *picadores* are succeeded by the *banderilleros*, who bring with them the *banderillas*, i.e. barbed darts, about two feet long, ornamented with colored paper flags, which they stick into the neck of the animal. Sometimes these darts have firecrackers attached to them, the explosion of which makes the bull furious. The *matador* then enters alone to complete the tragic business. As soon as the bull's eye catches the *muleta*, a small red cloak with which the *matador* lures the bull, he generally rushes blindly at it; and then the *matador*, if he is well skilled, dexterously plunges the sword 'between the left shoulder and the blade,' and the animal drops dead at his feet. Sometimes the *matador* essays a bolder coup, and with his cape crossed over his breast, awaits the onslaught, or he may leap over the charging bull and stab him with a *picador's* lance; or he deftly places two lances, one from each hand, between the shoulder-blades of the bull. The victorious *matador* is greeted with acclamations, and not less so the bull, should he wound or even kill the *matador*, in which case another *matador* steps forth into the arena; but human life is rarely sacrificed. Eight or ten bulls are often dispatched in a single day, twenty minutes being about the time usually taken to slay one.

BULLFINCH. A finch of the genus Pyrrhula, characterized by the short, thick, rounded bill, bulging at the sides, and hence suggesting the head of a bull; specifically the familiar European species (*Pyrrhula Europæa*), cultivated as a cage-bird. The bullfinch has very soft and dense plumage, delicate bluish-gray above, the under parts bright tile-red, the crown of the head and the beak jet-black, which color also appears in the greater wing and tail coverts, in the quills, and in the tail-feathers; the wings are crossed by a conspicuous white bar. The colors of the female are less bright than those of the male. It frequents woods and gardens, builds its nest in low trees or bushes, feeds chiefly on seeds and berries in winter, and in spring is excessively destructive to the buds of fruit-trees in those localities in which it is abundant, as it selects the flower-buds.

The song of this bird, in a wild state, is very simple, and has no particular quality to recommend it; but it is remarkably susceptible of improvement by education, and trained 'piping' bullfinches of superior acquirements are sold at a very considerable price. Some of these birds learn to whistle an air very accurately, and with a power and variety of intonation far exceeding their natural song. The ability to whistle as many as six airs well has been attained. The training of these birds is a work both of time and trouble; it is chiefly carried on in Germany, where regular 'schools' exist for the purpose, and where various hybrid races are produced for the

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market. (See CAGE-BIRDS.) The bullfinch is capable of very strong attachment to those who feed and caress it, and often becomes so thoroughly domesticated as to exhibit no desire for liberty. It is replaced in Eastern Europe and Asia by other species, and one (*Pyrrhula Cassini*) inhabits Alaska. See Plate of CAGE-BIRDS.

BULLFROG. The largest of North American frogs (*Rana Catesbiana*), and the largest representative of a genus of aquatic frogs widely distributed over the Northern Hemisphere. It is common in sluggish waters from Kansas eastward, and has received its name on account of its loud, bellowing, bass voice. It reaches a length of 7 or 8 inches, and is green in various shades, brightest on the head, and blotched about the legs. The eggs are laid in strings, and the tadpoles require two or more years to gain maturity. The hind legs of this frog taste like delicate spring chicken, and are often found in American markets, especially in the region of the Great Lakes, along whose borders these frogs are particularly large and abundant. (See colored Plate of AMERICAN FROGS AND TOADS.) Frogs of great size and power of voice are given the same name in some other parts of the world; thus the 'bullfrog' of English-speaking people of Siam and Malay is *Callula pulchra*, which is excessively noisy during the rainy season.

BULLHEAD, or **BULLPOUT** (so called on account of the size of its head). Any of the several fishes of the families Siluridæ and Cottidæ. In the United States most commonly the small catfish or horned pout (*Amiurus nebulosus*) of the fresh waters of the North and East, which varies from yellowish-brown to black, and grows to a length of 18 inches. It has been acclimated in California and is important as a food-fish in the Sacramento Basin, where it is known as 'Sacramento cat,' and is in great demand among the Chinese. "The horned pout," says Dr. Theodore Gill, "is a sluggish fish, fond of the mud, and growing best in weedy ponds and waters which have no current. They stay near the bottom and move slowly about, with their barbels widely spread, watching for anything eatable. They will take any kind of bait, from an angle-worm to a piece of a tin tomato-can. . . . . They are very tenacious of life, and will live in any sort of a pond or pool where frogs or salamanders can exist. . . They spawn in the spring, and the adult fishes lead the young in great schools near the shore, apparently caring for them as a hen cares for her chickens." For illustration, see CATFISH.

In Great Britain the name is given mainly to the ugly spinous fishes of the genus Cottus. They are mostly small and abundant in clear streams in northern Europe, Asia, and America. (See MILLER'S THUMB; SCULPIN.) The name 'armed bullhead' is often given to one of the gurnards (q.v.), a marine fish of a related genus (Agonus).

BULLIER, bụ'lyā', BAL. A noted place of resort, especially for students, in Paris, first called the Prado d'Eté, and later named for the founder, Bullier.

BULLINGER, bụl'ĭng-ẽr, HEINRICH (1504-75). A Swiss reformer. He was born at Bremgarten, in the Canton of Aargau, July 18, 1504. He was sent to the school of the Brothers of the Common Life at Emmerich when twelve years old, and there sang on the streets for his support as Luther did at Eisenach. In 1519 he went to Cologne to study at the famous University, and there he became acquainted with the writings of Luther, so that when he took his degree in 1552 he was already a Protestant. He taught at the school attached to the Cistercian monastery at Cappel, near Zürich, from 1522 to 1529, and aided in the introduction of the Reformation into Cappel, which took place gradually in 1525-26. He made Zwingli's acquaintance in 1523 and participated in the disputation with the Anabaptists at Zürich in 1525, and in the religious conference held at Bern in January, 1528, the result of which was the reformation of that canton. In June, 1528, he became evangelical pastor at Cappel. In 1529 he married Anna Adlischwyler, formerly a nun who bore him eleven children. In 1529 he succeeded his father as pastor at Bremgarten, and by a powerful sermon which he preached there he induced his whole congregation to burn the images in the church and pass reform laws. But after the defeat at Cappel, October 11, 1531, his position became insecure, and on the night of November 20-21 he fled to Zürich, where, on December 9, he was appointed pastor of the principal church in succession to Zwingli, and did a great work in building up a vigorous organization in the canton. He was, indeed, the second founder of the German Reformed Church. He also exerted great influence upon the Church of England through the Marian exiles (1553-58) whom he sheltered and counseled. They displayed their gratitude in various ways, and in 1586 Convocation enjoined the reading of his sermons upon 'inferior ministers.' In the controversy on the eucharist and the affairs of the Anabaptists, Bullinger distinguished himself by his integrity and moderation, and in his house in Zürich several German theologians, compelled to leave their country, found a haven of refuge. He shared in the first (1536) and was sole author of the second Helvetic confession (1566). He died in Zürich, September 17, 1575. His writings are numerous, but uncollected and unreprinted. The most important is a *History of the Reformation*, in Swiss-German (first edited and printed, 3 vols., Frauenfeld, 1838-40). Several of his treatises have appeared in German, and especially fifty of his sermons, divided into five decades, hence commonly known as Bullinger's *Decades* (London, 1577), reprinted by the Parker Society, Cambridge, England (1849-52). For his life, consult: Solomon Hess (Zürich, 1828-29); Carl Pestalozzi (Elberfeld, 1858); also R. Christoffel, *Heinrich Bullinger und seine Gattin* (Zürich, 1875); G. R. Zimmerman, *Die züricher Kirche und ihre Antistes* (Zürich, 1877).

BULLION, bŭl'yon (Low Lat. *bullio*, mass of gold or silver, dimin. of Lat. *bulla*, boss, stamp, seal, or perhaps corrupted from Fr. *billon*, Sp. *vellon*, base coin, Low Lat. *billio*, bullion). This term is usually employed to designate uncoined gold or silver, which has been reduced to the standard fineness of the coinage of a country, but is sometimes used to designate the metals generally, whether coined or uncoined. The latter use is quite common in England, where the metallic reserve of the bank is reported as so much bullion. In the United States bullion is rarely applied to coin. Gold in bars answers

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some of the monetary purposes of coined gold when it is used as a reserve for note issues. The act of March 3, 1863, which authorized the issue of gold certificates, provided that they could be issued against either gold coin or bullion deposited in the treasury of the United States, which, on June 30, 1901, in aggregate gold holdings of $495,000,000, held $109,000,000 in bars. In the same way the great national banks of Europe, which, like the United States treasury, are storehouses from which gold can be drawn for exportation, hold a portion of this reserve in bars. For international shipments gold bars possess certain advantages over coin, and a large part of the gold shipped from the United States is in this form. In the fiscal year ending June 30, 1901, $43,658,107 were exported. See PRECIOUS METALS.

BULLION STATE. Missouri. See STATES, POPULAR NAMES OF.

BULLOCK, bul'lok, ALEXANDER HAMILTON (1816-82). An American politician. He was born in Royalston, Mass.; graduated at Amherst College in 1836, studied at the Harvard Law School, was admitted to the bar in 1841, and practiced law in Worcester. He was a member of the Massachusetts House of Representatives from 1845 to 1847, and again from 1861 to 1865, and was its Speaker during the latter period. He was also a member of the State Senate in 1849. Besides holding several judicial offices, he was Mayor of Worcester in 1859, and Governor of Massachusetts in 1866-68.

BULLOCK, RUFUS BROWN (1834—). An American politician. He was born in Bethlehem, N. Y., but in early life went to Augusta, Ga., to organize the Southern Express Company. During the Civil War he served as acting assistant quartermaster-general in the Confederate Army, and in 1867 he was a delegate to the State Constitutional Convention. In 1868 he was elected Governor of Georgia. Soon afterwards the colored members were expelled from both Houses of the Legislature, and Governor Bullock appealed to Congress to restore them to their seats. The next legislative election, however, brought in such a large majority opposed to the reconstruction policy that he resigned his office. Since then he has been president of the Macon and Augusta Railroad, president of the Atlanta Cotton Mills and of the Atlanta Chamber of Commerce, and Government director of the Union Pacific Railroad.

BULLOCK, WILLIAM A. (1813-67). An American inventor. He was born at Greenville, N. Y., and early learned the trade of iron-founder and machinist. About 1855 he went to New York City, where he constructed a fast press on the planetary system for an illustrated weekly. The remarkable success of this invention encouraged him to perfect a printing-press embodying in one machine automatic adjustment and feeding, 'perfecting,' as printing on both sides is called, at a high rate of speed. Thus was invented the web perfecting press, capable of turning out 30,000 newspapers, cut apart and folded, within an hour. While engaged in setting up a new press in Philadelphia, Mr. Bullock was accidentally caught in the main driving-belt and sustained injuries which caused his death.

BULLOCK'S-HEART. See CUSTARD-APPLE.

BULL RUN, FIRST BATTLE OF. The first important battle of the Civil War. It was fought on Sunday, July 21, 1861, near a small stream of this name, in northeast Virginia, about 30 miles southwest of Washington, between a Federal army under General McDowell, and a Confederate army under Generals Beauregard and Johnston. On each side the troops were green, poorly drilled, and wholly inexperienced. The Federal right, under Hunter, began the battle at 10 A.M. by a flank attack, and, supported by the centre under Tyler, drove the Confederate left before it until stopped, while ascending a slope, by a brigade under Jackson, who here earned the sobriquet 'Stonewall.'

POSITION OF OPPOSING FORCES ON JULY 20, 1861.

After several stubborn attacks McDowell finally (about 3 P.M.) gained the disputed ground, and held it for an hour; but a Confederate reenforcement having arrived, Johnston, who had been posted in the rear of the Confederate lines, suddenly attacked in force, and drove the Federal troops in great confusion, first from their position, and then from the field. The defeat became a rout and then a panic, and the troops fled in wild disorder, reaching Washington in a state of utter demoralization. The Confederates, disorganized almost as much by victory as the Federals were by defeat, made no attempt at pursuit. McDowell had at his disposal about 29,000 men, and Johnston about 28,000, though the number actually engaged was only about 18,000 on each side, of which the Federals lost, in killed, wounded, and captured or missing, about 2800; the Confederates about 2000. The battle caused great consternation in the North and great enthusiasm in the South, while abroad, and especially among the upper classes in England, it was regarded as conclusive proof of the superior fighting capacity of the Confederate troops. It may be regarded as having, in effect, changed the status of the conflict from that of a rebellion to that of a civil war. By the Confederates the battle was generally called the 'Battle of Manassas.' Consult: *Official Records*, Vol. II. (Washington, 1880); Ropes, *Story of the Civil War* (2 vols., New York, 1894-98); Johnson and Buel (editors), *Battles and Leaders of the Civil War*, Vol. IV. (4 vols., New York, 1887); and Nicolay and Hay, *Abraham Lincoln: A History* (10 vols., New York, 1890).

BULL RUN, SECOND BATTLE OF. An important battle of the Civil War, fought August 29 and 30, 1862, between a Confederate army of about 50,000, under General Lee, and a Fed-

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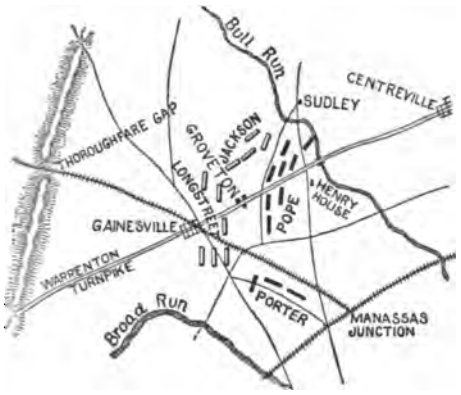
eral army of about 70,000, under General Pope. While Pope, at the head of the Army of Virginia and a large part of the Army of the Potomac, was facing Lee along the line of the Rappahannock, Jackson, by a forced march, attained his rear through Thoroughfare Gap, with a force of about 25,000, and destroyed (August 26) the Federal supplies and munitions of war at Manassas and Bristow stations. Pope then turned, and on August 28 faced Jackson near Bull Run, but delayed his attack for a day, and at 10 A.M. on the 29th, Lee and Longstreet, hav-



SECOND BATTLE OF BULL RUN.

ing passed through Thoroughfare Gap almost unopposed, effected a junction with Jackson. At 3 P.M. Hooker, under Pope's orders, made the first serious attack on Jackson, but was driven back with considerable loss. Subsequently Kearney and McDowell also attacked, with somewhat more success. Meanwhile Porter, on the Federal left, had held Longstreet in check, though Pope, who did not know of the Confederate reënforcement, had expected him to attack Jackson in flank and rear. At the close of the day each side claimed a victory. This first day's fighting is sometimes called the battle of Groveton, from the small village which formed the centre of Jackson's position. At noon on the 30th Pope ordered McDowell, Porter, and Heintzelman "forward in pursuit of the enemy." Their attack was repulsed with great loss, and Longstreet, by a counter-attack, gradually forced the Federal army off the field. Pope, crossing Bull Run, took up a position at Centreville during the night of the 30th, and on September 1st withdrew to the defenses about Washington, fighting the battle of Chantilly (q.v.) en route. The Federal loss, though never accurately determined, was about 14,500, while that of the Confederates was about 9500. The battle closed Pope's campaign, by forcing his army back upon Washington, and enabled Lee to take the aggressive and invade Maryland. (See ANTIETAM, BATTLE OF.) By the Confederates it was called the Second Battle of Manassas. Consult: *Official Records*, Vol. XII. (Washington, 1885); Ropes, *Story of the Civil War* (2 vols., New York, 1894-98), and *The Army Under Pope* (New York, 1881); Cox, *The Second Battle of Bull Run* (Cincinnati, 1882); and Buel and Johnson (editors), *The Battles and Leaders of the Civil War* (4 vols., New York, 1887).

BULLS AND BEARS. A common designation in the stock markets for two classes of operators, the 'bulls' being those who seek to advance prices, and the 'bears' those who endeavor to bring them down. A fanciful derivation of the term is that a bull tosses up with his horns, while a bear tears down with his claws.

BULL-SNAKE. See PINE-SNAKE.

BULL-TERRIER. A cross-breed between the bulldog and some terrier. See TERRIER.

BULL-TROUT. (1) A salmon-like trout (*Salmo trutta*) of northern Europe. (See SALMON-TROUT.) (2) The Dolly Varden trout. See TROUT.

BULMER, bu̧l'mẽr, VALENTINE. In Scott's *Saint Ronan's Well*, the pretended Earl of Hetherington, who enters into a clandestine marriage with Clara Mowbray and attempts to rob Francis Tyrrel, the real earl, of the proofs of his identity. He is finally shot by the deceived woman's brother.

BULNES, bōōl'nās, MANUEL (1799-1866). A Chilean statesman, born in Concepción. At the age of sixteen he was imprisoned as a revolutionist by the Spanish authorities, but was soon released, and in 1818 joined the army of San Martin (q.v.) under whom he served as colonel throughout the Chilean Revolution. After a continuous warfare of three years (1820-23), he accomplished the temporary conquest of the Araucanian Indians. He was appointed brigadier-general in 1831; commanded the Chilean army sent in 1838 against General Santa Cruz in Peru; and after taking Lima and winning the battles of Huarez and Puente del Bunin, combined his forces with those of Gamarra and defeated Santa Cruz at Pan de Azúcar (January 19, 1839), thus putting an end to the confederation between Peru and Bolivia. In recognition of his services he was appointed lieutenant-general and created Marshal of Ancacho. Afterwards he served for two successive terms (1841-45, 1846-50) as President of Chile, and by his firm and able administration greatly contributed to the prosperity of the country.

BÜLOW, bu̧'lō, BERNHARD, Count von (1849—). A German statesman, born at Klein-Flottbeck, Holstein. He studied in Lausanne, Leipzig, and Berlin, served in the Franco-Prussian War, and in 1874 entered the German Foreign Office. He became secretary of legation at Rome, Saint Petersburg, and Vienna, was chargé d'affaires at Athens during the important period of the Russo-Turkish War of 1877-78, and was appointed a secretary at the Berlin Congress. After further diplomatic service in Paris and Saint Petersburg he was sent as Minister to Rumania in 1888, and as Ambassador to Italy in 1893. In 1897 he was appointed Foreign Secretary, and in 1899 concluded with Spain the treaty by which Germany acquired possession of the Caroline, Pelew, and Ladrone islands. He became Chancellor of the German Empire and Prime Minister of Prussia in 1900. His policy has been one of imperial expansion.

BÜLOW, DIETRICH ADAM HEINRICH, Baron (1757-1807). A German military historian, born at Falkenberg, Prussia, and educated at the military school in Berlin. In 1792 he came to America, where several years afterwards he

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lost his entire fortune. Upon his return to Berlin he wrote his principal work, *Der Geist des neuen Kriegssystems* (1798; 3d ed., 1835), which created a great sensation. Afterwards he lived in London (where he was imprisoned for debt) and in Paris, whence he was banished in 1804. In consequence of his extremely satirical work entitled *Der Feldzug von 1805* (Leipzig, 1806), he was imprisoned at the request of the Russian Government, first in Berlin, then in Kolberg, and finally in Riga, where he is said to have died in great misery. By his admirable writings on military tactics he greatly furthered the science of war.

BÜLOW, Friedrich Wilhelm, Baron von, Count von Dennewitz (1755-1816). A Prussian general in the War of Liberation, brother of the preceding. He was born at Falkenberg, and entered the army in his fourteenth year. In 1813 Bülow was the Prussian commander in the first successful encounter with the French at Möckern (April 5), and later at Halle. His victories over Oudinot at Grossbeeren and Ney at Dennewitz saved Berlin and inflicted severe loss on the enemy. He acted a conspicuous part in the battle of Leipzig, and by taking possession of Montmartre finished the campaign of 1814. The King acknowledged his services by an estate worth $150,000 and the title of Count Dennewitz. In the campaign of 1815 he joined Blücher by forced marches, and headed the column that first came to the aid of Wellington at Waterloo. He was made a Knight of the Black Eagle, and after Waterloo a Prussian regiment received his name. He died in Königsberg, February 25, 1816. A marble statue to his memory was erected in Berlin.

BÜLOW, Hans Guido von (1830-94). A German pianist and conductor, born in Dresden. He studied the pianoforte under Friedrich Wieck, and harmony and counterpoint under Eberwein and Hauptmann. In 1848 he entered the University of Leipzig to study law, but the next year went to Berlin, and after hearing a performance of *Lohengrin*, conducted by Liszt in Weimar in 1850, he resolved to make music his profession, much to the disappointment of his father, Eduard von Bülow, a littérateur of reputation. He placed himself under Wagner in Zurich; but subsequently went to Weimar to study the pianoforte with Liszt. In 1853 and 1855 he made concert tours in Germany and Austria with moderate success. In 1855-64 he was principal instructor of the pianoforte in the Conservatory of Berlin, where he organized symphony and chamber concerts, and contributed musical articles to the press to advance the theories of Liszt and Wagner, and also edited the *Neue Zeitschrift für Musik*. In 1864 he became director of the conservatory and conductor of the royal opera in Munich, where he conducted the first performances of Wagner's *Tristan and Isolde* and *Die Meistersinger*. In 1869 the relations of his wife (Cosima Liszt, whom he had married in 1857) with Wagner compelled him to leave her. This personal wrong did not in any way affect his worship of Wagner the musician, although he never wanted to meet again Wagner the man. He settled in Florence, and until 1872 gave numerous concerts to spread German music in Italy. Afterwards he went to London, and in 1875-76 visited the United States. Subsequently he was conductor of various orchestras in Germany, and again visited America in 1889 and 1890. He died in Cairo. Bülow was one of the greatest pianists of his century, and his fame as a conductor was equally great. His performances were characterized by the complete sinking of his own personality in the genius of whatever master he was interpreting and by attention to minutest details. His memory was extraordinary; he played and conducted everything without notes, although his repertory included all the important literature for the pianoforte and orchestra. He was, perhaps, the most erudite of musicians, and his scholarly attainments extended beyond his profession. Von Bülow was the greatest authority on Beethoven, and published a valuable edition of his pianoforte works. He also made pianoforte transcriptions from Wagner, Liszt, and Berlioz. His original compositions include: Music to Shakespeare's *Julius Cæsar*, op. 10; *Des Sängers Fluch*, ballad for orchestra on Uhland's poem, op. 16; and *Nirwana*, a '*symphonisches Stimmungsbild*,' for orchestra, op. 20. His *Letters* (3 vols., 1895-98) were published by his widow, English translation by C. Bache (1st vol., 1897). Consult Pfeiffer, *Studien bei Hans von Bülow* (Berlin, 1894).

BÜLOW, Karl Eduard von (1803-53). A German author. He was born at Berg vor Eilenburg, and was educated at the University of Leipzig. His literary fame rests chiefly upon his *Novellenbuch* (1834-36), which contains 100 novels, based on older specimens in Italian, Spanish, French, German, English, and Latin. This publication was followed by several others of a similar character.

BÜLOW, Margarete von (1860-84). A German novelist. She was born in Berlin, and spent her early years partly in Thuringia and partly in Smyrna, where her father was Prussian consul. She was drowned in the Rummelsburger Lake, near Berlin, while endeavoring to save the life of a boy who had broken through the ice while skating. Her novels, several of which attained a rapid popularity, include the following: *Novellen* (1885); *Neue Novellen* (1890); *Jonas Briccius* (1886); *Herr im Hause* (1886).

BULOZ, bu'lō', François (1803-77). A French editor. He was born at Vulbens, in Haute Savoie, settled in Paris, and became a proof-reader and translator. In 1831 he took charge of the *Revue des Deux Mondes*, which had been established two years before. This bimonthly, probably the most celebrated review in the world, he edited with conspicuous ability until his death. He also conducted the *Revue de Paris* from 1835 to 1845. During the ten years 1838-48 he was director of the Comédie Française.

BULRUSH (so called from its large size). A popular name for large rushlike or reedlike plants growing in marshes. Some authors employ it in a restricted sense as the designation of plants of the genus Typha, also known as cattail or reed-mace. It is perhaps more commonly restricted to large species of the genus Scirpus, also called club-rush, and particularly to Scirpus lacustris, a common plant, found in all the northern parts of the world, growing about the muddy margins of lakes and ponds, with a creeping root and round stems varying from 2 to 10 feet in

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height, which are almost leafless, and bear their flowers in compound umbels of small brown spikelets. The root is astringent and diuretic, and was formerly employed in medicine; but the stems are the most useful part of the plant, being much employed for making chair-bottoms, mats, etc.; also by coopers for filling up spaces between the seams of casks, to which purpose their spongy nature particularly adapts them, and not unfrequently for thatching cottages. A variety, common in California, is much used as covers for wine-bottles in packing. There are a number of other tall-growing species of Scirpus in different parts of the world that resemble the bulrush in appearance and uses. See TYPHA.

BULSAR'. A seaport of British India, in the District of Surat, Bombay, on the estuary of a small river of the same name, which falls into the Gulf of Cambay. It is 44 miles south of Surat (Map: India, B 4). It is a thriving place, with manufactures of ginghams, and a considerable trade in grain, salt, and sugar, and the export of timber. Population, about 13,200.

BULTHAUPT, bōōlt'houpt, HEINRICH (1849 —). A German poet, dramatic author, and lawyer, city librarian of his native town, Bremen. In both the lyrical and the dramatic genres, Bulthaupt gives evidence of exceptional talent and versatility, and many of his works have achieved great popularity. His dramatic productions include *Saul* (1870); *Ein corsisches Trauerspiel* (1872); *Die Arbeiter* (1877), in which work a distinctively modern subject is treated with admirable skill; *Gerold Wendel* (2d ed., 1890); *Die Kopisten*, comedy (1875); *Lebende Bilder*, comedy (1875). He also furnished the text to several oratorios composed by Bruch and Vierling, has prepared adaptations of Shakespearean dramas (*Cymbeline*, 1885, and *Timon von Athen*, 1894); and has written a number of poetic works (*Durch Frost und Gluten*, 2d ed., 1892), and criticisms, notably that entitled *Shakespeare und der Naturalismus*, as well as four novelettes. The work by which he has achieved especial distinction, however, is the *Dramaturgie der Klassiker* (1882, et seq., and frequently reprinted)—a splendid exposition of the dramatic art of Shakespeare and of the German classicists and their successors of the Nineteenth Century.

BULUWAYO, bōō'lōō-wā'yō, or **BULAWAYO.** The capital of Matabeleland, and chief commercial town of British Rhodesia, Central Africa, situated about 250 miles southwest of Salisbury (Map: Africa, G 7). It has a number of mercantile houses, banks, schools, churches, and several newspapers. It is connected by rail with the British possessions in South Africa, and its white population numbers over 7000.

BULWARK (Dan. *bulværk*, from *bul*, trunk of a tree + *værk*, Ger. *Werk*, Engl. *work*). In military matters, the old name for a rampart or like defense. In a ship, the bulwarks are the part of a ship's side which projects above the level of the upper deck. In ordinary vessels they form a parapet, protecting the seamen from the waves, and preventing loose articles from being swept off the deck; in men-of-war they, in addition, serve to protect the men from an enemy's small-arm fire.

BUL'WER-LYT'TON, EDWARD GEORGE EARLE, first Lord Lytton (1803-73). An English novelist, born in London, May 25, 1803. He was the youngest son of William Earle Bulwer of Heydon Hall, Norfolk, and Elizabeth Barbara Lytton of Knebworth, Hertfordshire. His father died in 1807; and on the death of his mother in 1843, Bulwer assumed her surname. After attending various schools, he proceeded to Cambridge, and graduated B.A. from Trinity Hall in 1826. At the university he read extensively in history, won the chancellor's medal for a poem, and was regarded as one of the best speakers in the Union Society. Parts of 1825 and 1826 he passed in Paris, where he was admitted into the 'most brilliant houses of the old noblesse.' He returned to England, a typical dandy of the period, and married (1827) a clever Irish girl named Rosina Doyle Wheeler. As the marriage caused an estrangement between mother and son, Bulwer was thrown largely on his own resources for a living. He wrote extensively for the magazines and the annuals, and produced novel after novel. The marriage proved most unhappy, and a legal separation was granted June 14, 1836. On the death of his mother, he succeeded to the Knebworth estate. Bulwer sat in Parliament during two long periods, first as a Protectionist Liberal and then as a Conservative (1831-41 and 1852-66). In 1858 he was appointed Secretary for the Colonies, and in 1866 was raised to the peerage as Baron Lytton. Though not a ready debater, he succeeded well with prepared speeches. He died in Torquay, January 18, 1873, and was buried in Westminster Abbey. Bulwer was a versatile writer. He composed verse at the age of seven and published a volume when a schoolboy (1820). Other volumes followed in 1823, 1825, and 1827. At this time Bulwer was passing through several phases of Byronic influence. Among his later poems are *The New Timon* (1846), *King Arthur* (1848), and *Saint Stephens* (1860). The first has become memorable for a fierce assault on Tennyson and for Tennyson's reply in *Punch*. Of the various metres Bulwer essayed, he succeeded best in the heroic couplet. He wrote several plays, which, though mediocre as literature, have long kept the stage; among them are *The Lady of Lyons* (1838), *Richelieu* (1838), and *Money* (1840). Attempting the work of Gibbon, he wrote *Athens, Its Rise and Fall* (1837), but it was never completed. As a novelist he played many parts, adapting himself to public taste. He began with *Falkland* (1827), an interesting imitation of the *Sorrows of Werther*. His success as a novelist was assured by *Pelham* (1828), deemed by many critics the most delightful of all his books. He had now passed beyond the influence of Byron and German sentimentalism, and presented the public with a new type of gentleman, the cynic in black waistcoat moving in high society. *Pelham* became in a way the type of the novel of contemporary manners to which Bulwer reverted at intervals: as in *Ernest Maltravers* (1837); *Alice* (1838); *Night and Morning* (1841); *The Caxtons* (1850); *My Novel* (1853); and *Kenelm Chillingly* (1873). The last three have the added aim of humor in the manner of Sterne. Taking up the criminal novel as left by William Godwin, Bulwer published *Paul Clifford* (1830) and *Eugene Aram* (1832). An experiment with the historical novel in *Devereux* (1829) led to the widely popular *Last Days of Pompeii* (1834); *Rienzi* (1835); *Leila, or the Siege of Granada*

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(1838); *The Last of the Barons* (1843), by far his most solid achievement in historical fiction; *Harold* (1848); and *Pausanius the Spartan* (1876). Romance was essayed in *The Pilgrims of the Rhine* (1834); *Zanoni* (1842); *The Haunted and the Haunters* (1859), a capital ghost story; and *A Strange Story* (1862) and *The Coming Race* (1871). With the critics Bulwer has never found much favor. His work possesses none of the art of the great craftsmen and it is affected in sentiment and style. But in spite of these faults, which were often pointed out by his reviewers, Bulwer gained the attention of the public at large, and still holds it. *The Caxtons* and *The Coming Race*, though published anonymously to test the public, were as well received as any of the other novels. Bulwer's continued popularity rests upon the fact that he had something to say that is still of interest. His manner is wisely overlooked. Consult: *Life, Letters and Literary Remains of Edward Bulwer*, by his son, the Earl of Lytton (London, 1883), containing the fragment of a poetic autobiography; and the biographies by Cooper (London, 1873) and ten Brink (Leyden, 1882).

BULWER-LYTTON, EDWARD ROBERT. See LYTTON, EDWARD ROBERT BULWER.

BULWER, bul'wēr, WILLIAM HENRY LYTTON EARLE, Baron Dalling and Bulwer (1801-72). An English diplomat and author, familiarly known for years as Sir Henry Bulwer. He was born in London, February 13, 1801, a descendant of illustrious families on both sides, and was educated at Sunbury, Harrow, and Cambridge. In 1822 he published his first literary work, remarkable for its prophetic dedication to his younger brother, Edward Lytton Bulwer. In 1824, as agent for the London Greek committee, with a large amount of money consigned to Prince Mavrocordato, he made an adventurous journey to Morea, which he described in *An Autumn in Greece* (1826). He entered the army, but abandoned it for the diplomatic service, and from 1827 was attached successively to the British embassy at Berlin, Brussels, and The Hague, acquiring a brilliant reputation. In 1830 he entered Parliament as an advanced Liberal, and in 1837 became secretary of embassy at Constantinople, where he negotiated and concluded a treaty which is the foundation of Great Britain's commercial system in the East. In 1843 he was made Minister Plenipotentiary to the Court of Madrid, and concluded the peace between Spain and Morocco in the following year. While in Spain his firmness and candor proved inconvenient to Narvaez, the Spanish soldier-dictator, who, accusing him of plotting against the Spanish Government, ordered him to leave Madrid, May 19, 1848. Parliament approved of Bulwer's conduct, and he was awarded the highest decorations of the Order of the Bath. In 1849-52 he was Minister at Washington, where he negotiated the Clayton-Bulwer treaty in 1850. (See CLAYTON, JOHN MIDDLETON.) In 1852 he went to Tuscany as envoy extraordinary, and in 1856 was nominated commissioner at Bucharest for investigating the state of the Danubian principalities. He was appointed Ambassador to the Porte in 1858, and held the position until 1865. In 1871 he was created Lord Dalling and Bulwer. He died in Naples May 23, 1872. His works include *France, Social, Literary, and Political* (London, 1835-36); a *Life of Byron* (1835); *Historical Characters* (1868-70); and an unfinished *Life of Palmerston* (1870-74).

BUM'BLE. A fat, pompous beadle in Dickens's *Oliver Twist*. After terrorizing the starved denizens of the workhouse for many years, he 'sells himself' to the matron of that place, Mrs. Cornish, for "six teaspoons, a pair of sugar-tongs, and a milk pot; with a small quantity of second-hand furniture and twenty pounds in money," and is terrorized by her himself. From his character, the word 'Bumbledom' sprang into common use, being especially taken up in *Punch*, in the caricatures by Leech and Tenniel.

BUMBLEBEE, or HUMBLEBEE. One of the social bees of the genus Bombus. It has a thick and very hairy body, the hairs often arranged in colored bands; and differs from the honey-bees in having the tibiæ of the hinder legs terminated by two spines. The species are numerous and are found in almost all parts of the world, from the equator to the utmost polar limits of vegetation, but they seem to abound most of all in temperate climates. None is to be found in Australia and New Zealand, so that it was necessary to acclimatize these bees in those countries before clover could be successfully grown there, since that plant depends upon this kind of bees for fertilization. Consult *Insect Life*, Vol. IV. (Washington, 1891). (See CROSS-FERTILIZATION.) The form of the name 'humblebee,' commonly heard in Great Britain, is a modification of *hummel*, or *hummer-bee*, and, like our 'bumblebee,' refers to the loud droning sound produced partly by the wings, but mainly within the tracheæ of these insects.

Bumblebees do not form communities so large as those of honey-bees; seldom more than two or three hundred occupying one nest, and in some species not more than fifty or sixty. The females are much less prolific than those of honey-bees. The community is dissolved on the approach of winter, since males and workers die, and only females remain in a torpid state—among moss, in rotten wood, or in some other situation where they may enjoy protection from frost, and concealment from enemies—to perpetuate the race by founding new communities in the ensuing spring. A fertile female selects for a nest a hollow log or cavity among stones, or some deserted mouse-nest or other hole in soil. Then she procures a mass of pollen and honey, and in the mixture deposits a few eggs. The first brood consists entirely of workers. When some workers are matured, the fertile female abandons the collection of pollen and confines herself to the duties of egg-laying. The workers collect the food, assist the young out of their cocoons, and enlarge the nest to meet the needs of the increasing numbers of the colony. The workers build rude waxen cells, but without the orderly arrangement of those of the honey-bee. (For picture of nests and eggs, see Plate of WILD BEES.) Workers are chiefly produced in the earlier part of the season, males and perfect females in the latter part of it. The females are larger than the males and workers. Bumblebees differ from honey-bees in that their females exist together in the same community without seeking to destroy one another. There is among them nothing analogous to swarming. Their combs do not exhibit the beautiful regularity of structure which characterizes those of the honey-bees; but cells of a comparatively coarse appearance are

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clustered together, with silken cocoons of pupæ, balls of the kind already noticed, and open cells or pots filled with honey. These are preyed upon by mice and many large animals, which devour the brood as well as the honey. See colored Plate of BENEFICIAL INSECTS for portrait. See BEE.

BUMBLEFOOT (from *bumble*, a bungle, botch, referring to the misshapen foot). The name applied to a peculiar corn or abscess on the bottom of the foot of fowls. Some breeds are believed to be more susceptible to the trouble than are others. The disease is considered to be due to sitting on narrow perches or to walking on sharp gravel or on cement. Some cases are incurable, but the daily application of lunar caustic usually gives good results. Where pus is formed the abscess may be lanced or cut out.

BUMBOAT (perhaps Dutch *bumboat*, from *bun*, chest + *boot*, boat). A boat carrying provisions and other articles to ships lying in the stream—i.e. at anchor, and not alongside a wharf. In the case of men-of-war, bumboats are commonly allowed even when the ship is at a wharf, as very few of the crew can go on shore except on certain days. In the United States Navy the bumboat is inspected by the master-at-arms as soon as alongside, in order to see that no unauthorized articles are on board, and by the surgeon if the climatic conditions are such as to render special attention to diet necessary. Only persons of good reputation are allowed to traffic with the men, and these only after obtaining the consent of the executive officer. The bumboats ordinarily have for sale pastry, milk, fruit, confectionery, tobacco, cigars, cigarettes, stationery, sewing materials, handkerchiefs, towels, soap, etc. Nearly all large vessels of the navy have a commissary's store, frequently called the canteen, in which the same class of supplies are to be had as in the bumboat, but of greater variety and at much lower prices, as the prices charged are only about sufficient to insure against loss. Any profit which may accrue is applied to the general mess fund of the enlisted men. As might be expected, the commissary's store has rendered the bumboat of much less importance to the men.

BUM'MALO'TI (E. Ind.). A marine fish (*Harpodon nehereus*) of the family Synodontidæ, which is rather closely related to the Salmonidæ. It is a native of the coasts of India, particularly of the Bombay and Malabar coasts, from which it is exported in large quantities, salted and dried, to other parts of India and other places. It is highly esteemed for its rich flavor, and often used as a relish. In commerce, it is known not only as bummaloti, but also by the singular name 'Bombay duck.' It is a fish of elongated form, with large fins and a very large mouth, the gape of which extends far behind the eyes, and which is furnished with a great number of long, slender teeth. It is very voracious.

BUMP'ER, Sir HARRY. One of Charles Surface's dissolute friends in Sheridan's *School for Scandal*. He appears in Act iii. Scene 3, and sings there the jovial drinking song, "Here's to the Maiden of Bashful Fifteen," etc.

BUMPING POSTS. Devices erected at the ends of railway tracks in yards and stations to prevent cars from running off the track onto the ground or across the platform. A pile of cross-ties or a bank of earth or cinders are sometimes used as bumping posts, and sometimes the ends of the rails are turned up and have a strong timber bolted to them extending across the track. The usual construction of bumping post is a strong timber frame carrying dead-woods or buffers at the proper height to receive the blows of the car coupler or platform. Sometimes the buffer consists of a hydraulic cylinder carrying a piston with a piston-rod provided at its outer end with a heavy disk against which the car strikes. The purpose of the hydraulic buffer is to reduce the shock of the striking car. Spiral spring buffers are used for the same purpose. Portable bumping posts of metal are made, which are attached to the rails wherever desired. These portable bumping posts are commonly called stop-blocks. A great variety of special and patented forms of bumping posts are made and used.

BUMP'PO, NATTY. See LEATHERSTOCKING.

BUMP'US, HERMON CAREY (1862—). An American educator, born in Buckfield, Maine. He graduated in 1884 at Brown University, and from 1886 to 1889 was professor of biology in Olivet College. From 1890 to 1901 he was assistant professor of zoölogy in Clark University, from 1891 to 1892 associate professor, and in 1892 was appointed professor of comparative anatomy in Brown University. He also became, in 1898, director of the biological laboratory of the United States Fish Commission at Wood's Holl, Mass., and in 1901 assistant to the president and curator of the department of invertebrates in the American Museum of Natural History in New York. In addition to many articles and monographs, he has published *A Laboratory Course in Invertebrate Zoölogy* (1893).

BÜNAU, bü'nou, HEINRICH, Count (1697-1762). A German statesman and historian, born in Weissenfels. He studied law at the University of Leipzig, and successively occupied several of the highest judiciary offices in Saxony, and later entered the service of the Emperor Charles VII. He was a patron of scientists and one of the ablest historians of his day. The following are some of his principal publications: *Deutsche Kaiser- und Reichshistorie* (1728-43), an admirable work, but uncompleted; *Historie des Krieges zwischen Frankreich, England und Deutschland* (1763-67).

BUNCE, FRANCIS MARVIN (1836—). An American naval officer. He was born in Hartford, Conn., and graduated at the United States Naval Academy in 1857. At the beginning of the Civil War he was executive officer on the *Penobscot*, which was engaged in the blockade off Wilmington, N. C. (1862), and he afterwards commanded the expedition which resulted in the capture of Morris Island, S. C. (July 10, 1863). He served on the monitor *Patapsco* at the siege of Charleston, where, in November, 1863, he was wounded. In 1865 he took the monitor *Monadnock* from Philadelphia to San Francisco upon the first extended sea voyage ever made by a monitor. He became a lieutenant-commander in 1863, a commander in 1871, a captain in 1883, and a commodore in 1895. He was commander of the naval training station at Newport, R. I., from 1891 to 1894, and was commandant of the North Atlantic station from 1895 to 1897, and of the New York Navy Yard from 1897 to 1899. On December 25, 1898, he retired with the rank of rear-admiral.

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He had charge of the naval demonstration at the dedication of General Grant's tomb on April 27, 1897.

BUNCE, JOHN or JACK. The lieutenant of the pirate sloop *Fortune's Favorite*, in Scott's novel *The Pirate*. An actor in his younger days, he prefers 'Frederick Altamont,' his stage name, to his humbler baptismal name. He protects Magnus Troil and his lovely daughters when they are captured off the coast of Orkney.

BUNCE, OLIVER BELL (1828-90). An American author. He was born in New York, where, for several years, he edited *Appleton's Journal*. He was the originator and editor of *Picturesque America;* wrote several novels; *Bachelor Bluff* (1882), a collection of social essays; and a small book on manners, entitled *Don't* (1884), which passed through many editions, and was translated into several foreign languages.

BUNCH, BARNABY. A humorous mender of old clothes, in Webster's play, *The Weakest Goes to the Wall*.

BUNCH, MOTHER. The imaginary author of certain jest books and fairy tales, which appeared in 1604 and 1760. The name is also derisively given to an alewife, by Tucca, one of the characters in Dekker's *Satiro-mastix*.

BUNCHBERRY. See DOGWOOD.

BUNCO, bŭn'kō (of doubtful origin: commonly derived from It., Sp. *banco*, bank). A term borrowed from the *argot* of the police, to describe a method of swindling much practiced in large cities. The sharper learns the name and residence of a wealthy stranger, accosts him in the street, pretends to be a relative of some prominent citizen of the stranger's town, and after securing his confidence, manages to rob him in any one of several customary ways, either by inducing him to cash a check, to bet, to lend money, or to buy alleged counterfeit money.

BUNCOMBE, bŭn'kŭm, or **BUNKUM** (from *Buncombe* County, N. C.). A term originating in the United States, but now adopted in England as well, to signify an oratorical display not accompanied by conviction, but made merely to catch popular applause; also used loosely for any unreal professions. The word is said to be derived from the name of Buncombe County, N. C., whose representative in the Sixteenth Congress (1819-21) made a very lengthy oration upon the Missouri Question, and informed the impatient members who interrupted him that he was 'speaking for Buncombe.'

BUN'DABERG. A port of Queensland, Australia, at the mouth of the Barnett, 180 miles northwest of Brisbane (Map: Queensland, H 8). It is an important centre of the sugar-growing industry. Population, 4000.

BUNDAHISH, bōōn'dȧ-hēsh. One of the Zoroastrian sacred books dealing with the universal order and government. See PAHLAVI.

BUNDELKHAND, bŭn'd'l-kŭnd (Skt. *Bandela Khanda*, land of the Bandelas). A political agency of Central India (q.v.) which embraces a territory comprising several large and petty native States lying between the British District of Jhansi on the west and Baghelkand on the east (Map: India, C 3). It formerly included Banda, Jalaun, Jhansi, and Hamirpur, four districts belonging to the British Northwest Provinces. Area of agency, 10,214 square miles. Population, in 1891, 1,508,000; in 1901, 1,309,300. The principal rivers are the Sindh, Betwȧ, Baighin, and Tons. The district is noted for its rich diamond-fields and deposits of iron ore. The chief towns are Panna, the seat of the principal diamond-beds, Kalingar, Chhatarpur, and Bijawar.

BUNDI, bōōn'dē. A town of India, in latitude 25° 26′ N., and longitude 75° 43′ E., 191 miles southwest of Agra, the capital of a small Rajput State of the same name (Map: India, C 3). It is situated in a valley nearly surrounded by rocky hills, and commands the chief hill pass. It has over 400 temples and shrines. The State of Bundi has an area of 2300 square miles. The rajah and dominant portion of the inhabitants are Rajputs; in the mountains are the Minas, supposed to be an aboriginal race. Population, in 1891, 296,000; in 1901, 171,227.

BUNGALOW, bŭn'gȧ-lō (Hind. *bangla*, adj. of *Banga*, Bengal). An Anglo-Indian term meaning in India a species of rural villa or house of light construction, usually of unbaked bricks with a thatched roof. Bungalows which are the residences of Europeans are of all sizes and styles, according to the taste and wealth of the owner. Some are of two stories, but usually they consist of only a ground floor with a central hall, and are invariably surrounded with a veranda, the roof of which affords a shelter from the sun. In the chief cities of India some of the bungalows are really palatial residences, while in the country they are of more moderate pretensions. In general, they are provided with exterior offices, to accommodate the large retinue of domestics common in Indian life. Besides these private bungalows, there are military bungalows on a large scale for accommodating soldiers in cantonments; likewise public bungalows, maintained by the Government for the accommodation of travelers, and in which seem to be blended the characters of an English roadside inn and an Eastern caravanserai. These bungalows are quadrangular in shape, one story high, with high-peaked roofs, thatched or tiled, projecting so as to form porticoes and verandas. The bungalow is divided into 'suites' of two, three, or four rooms, provided with bedsteads, tables, and chairs: windows of glass, and framed glass doors. Off each room is a bath-room, and earthen jars of cool water. Travelers are expected to carry their servants, cooking apparatus, wine, beer, bedding, etc., with them; but the khitmutgar of the better class of bungalows supplies tableware, condiments, and even sometimes food and liquors, and he is usually skilled in cooking. The Government charges 1 rupee, or 2 shillings a day, to each traveler for the use of the bungalow. Natives seldom stop in these public bungalows, but frequent the squalid village 'dhurrumsala.' At every travelers' bungalow is stationed a Government peon, who acts as watchman and is bound to assist travelers' servants in procuring supplies of fuel and food in the nearest village. The distance between the bungalows on a trunk-road is generally about 12 or 15 miles —an Indian day's journey. The introduction of railways is putting an end to this slow and annoying system of traveling in India. Sometimes modern summer cottages of a single story and projecting roof are called bungalows.

BUNGAY, bŭn'gȧ, FRIAR. A conjurer famous in the reign of Edward IV. He is described in

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contemporary works as "a great scholar and a magician (but not to be compared with Fryer Bacon)." He was a great friend of the latter philosopher's, and is reputed to have aided him in making the fabulous 'Brazen Head,' which spoke only the words "Time is! Time was! Time is past!" and then broke in pieces. Another story has it that Bungay and the great German necromancer Vandermast contested together for supremacy, and were snatched away to other realms by the devil. Robert Greene wrote a play called after him, in 1594, and in *The Last of the Barons* Bulwer introduces him as a union of necromancer, 'Merry Andrew,' and friar. See BACON, ROGER.

BUNGE, bōōng'e, ALEXANDER VON (1803-90). A Russian traveler and botanist. He was born in Kiev, and was educated at the University of Dorpat. His extensive and important travels through Asia (1826-29) with Lebedour are recorded in the work entitled *Karl Friedrich von Lebedours Reise durch das Altaigebirge und die Dsungarische Kirgisensteppe* (1829). In 1830 he accompanied a missionary expedition to China as naturalist, and later published the results of his botanical investigation on the steppe of Gobi and in the environs of Pekin in the works entitled *Enumeratio Plantarum Quas in China Boreali Collegit* (1831) and *Plantarum Mongholico Chinensium Decas I.* (1835). He was appointed professor of botany and director of the botanical garden at Dorpat in 1836.

BUNGE, FRIEDRICH GEORG VON (1802-97). A German legal historian, born in Kiev, and educated at the University of Dorpat, where, in 1831, he was appointed professor of law. Bunge was the editor of several periodicals, and published a large number of works on the laws of Livonia, Esthonia, and Courland, on which subject he was probably the greatest authority of his day. His principal writings include: *Forschungen auf dem Gebiete der Liv-, Esth- und Kurländischen Rechtsgeschichte* (1838) and *Das Liv- und Esthländische Privatrecht* (2 pts., 1847).

BUNGE, NIKOLAI KHRISTIANOVITCH (1823-95). A Russian political economist. He was born in Moscow, and was educated at the university in that city. In 1881 he was appointed assistant to the Minister of Finance, Abaza, and in 1882 he succeeded him. The condition of the Russian finances at this time was extremely unfavorable. The war debt of 1877 had not been paid, the deficit in the national exchequer had steadily increased, and the paper currency had diminished in value. Nevertheless Bunge succeeded in establishing important reforms. He increased the national prosperity by abrogating the poll-tax and the tax on salt, by establishing agrarian banks in order to facilitate the acquisition of land by the peasantry, and by enacting various other measures tending to improve the condition of the rural population. His works, which are written in Russian, are devoted principally to a discussion of current economic questions.

BUNGEN, bōōng'en (Ger., to drum). The 'drumless' or 'silent' street in Hamelin, down which the Pied Piper is supposed to have led the children. In this street dancing and playing were forbidden; even processions were obliged to interrupt the music while passing through it.

BUNGERT, bōōng'ert, AUGUST (1846—). A German musician, born in Mülheim, Rhenish Prussia. His masters were Kufferrath, Mathias, and Kiel, and he also studied in the Cologne and Paris conservatories. By many German musicians he has been regarded as one of the greatest composers of the Wagnerian school, but his trilogy based on the Homeric poems, and written directly on Wagnerian lines, seems not to have reached the spirit and significance of the model. His songs, however, are among the modern masterpieces of that kind of music. The two great opera cycles he has worked on include *Die Ilias*, comprising *Achilles*, and *Klytemnestra*, and *Die Odyssee* (1896), including *Kirke*, *Nausikaa*, *Odysseus' Heimkehr* (performed in Berlin in 1898), and *Odysseus' Tod*. There is an overture for each of these divisions; the entire work is entitled *Homerische Welt*. His other compositions include the comic opera *Die Studenten von Salamanca* (1884); a symphonic poem, *Auf der Wartburg; Hohes Lied der Liebe; Meerlieder;* and *Lieder einer Königin*.

BU'NIAS. A genus of plants of the natural order Cruciferæ, distinguished by incumbent linear, spirally twisted cotyledons (q.v.), and a nut-like silicule (or round pod) with two to four cells. The few known species are mainly natives of southeastern Europe and the Levant, but several are reported indigenous to France. *Bunias orientalis*, introduced into western Europe, is grown as a forage crop, and in some regions has escaped from cultivation. In Russia it is also used as a vegetable. Although a hardy plant, its cultivation is not general. The amount of herbage is small, and, on account of its hairy covering, is not readily eaten by cattle. It is sometimes called hill-mustard.

BUNION (It. *bugnone*, knob, OF. *bugne*, swelling, from Icel. *bunga*, elevation). A term applied in surgery to an enlarged bursa, or synovial sac, situated over the metatarsal joint of the first or the fifth toe (see FOOT), and accompanied by more or less distortion of the joint. In the great majority of cases bunions are directly produced by the pressure of badly fitting boots; and if the boots are of patent leather, or any material which stops the excreting action of the skin, this, too, may be regarded as an indirect cause of their formation. A bunion begins as a painful and tender spot over one of the metatarsophalangeal joints; the part gradually enlarges, and there are indications of an effusion into a natural bursa or a newly formed sac. The progress of the affection may stop here, the bursa remaining, and serving to protect the subjacent parts from pressure; but far more frequently a corn develops on the summit of the bunion, or suppuration results, with great suffering. Thickening of the periosteum may result in enlargement of the articular ends of the bones and permanent deformity.

In its early stage the treatment must be palliative. Pressure must be removed and wet dressings applied. If pus forms, the swelling must be incised. Ulceration must be treated as any similar wounds (q.v.), and internal supportive and tonic treatment is necessary. Excision of diseased bone or even amputation may be required. The ulcers resulting from the bursting of a bunion are very difficult to heal in old persons whose circulation is languid. Stimulating local application such as ointment of resin should be applied, while stimulants should be prescribed for internal use, together with nour-

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ishing diet. Such ulcers, under the best treatment, not very infrequently form the starting-point for senile gangrene.

BUNKER HILL, Battle of. The first severe battle of the American Revolution, fought June 17, 1775, on Breed's Hill and Bunker Hill, Charlestown, Mass., between about 3000 British troops under General Howe and about 1500 Americans under Col. William Prescott. On the night of the 16th Prescott was sent to fortify Bunker Hill, the possession of which would compel the evacuation of Boston by the British; but he threw up an earthwork on Breed's Hill instead, and there awaited the English attack. On June 17, at 3 P.M., the British charged up the hill, but were driven back with great loss. A second charge also was repulsed. At 4.30 o'clock, however, the British advanced again, and this time, the powder of the Americans being spent, succeeded in dislodging Prescott's men and forcing them from the field. The losses in killed, wounded, and missing were 1054 (including 157 officers) for the British, and about 450 for the Americans. Among those killed on the American side was General Warren. In the course of the engagement Charlestown was set on fire by British shells and was burned to the ground. Though Howe secured a strategic point which enabled him to retain his hold on Boston, the battle was morally a victory for the Americans, in that it demonstrated their fighting capacity, and greatly increased the spirit of resistance throughout the country. The best account of the battle is probably that in Richard Frothingham, *Siege of Boston* (Boston, 1849). Consult, also, G. E. Ellis, *History of the Battle of Bunker's (Breed's) Hill* (Boston, 1875), and an excellent and discriminating article by C. F. Adams, Jr., in Vol. I. of *The American Historical Review* (New York, 1896).

BUNKER HILL MONUMENT. An obelisk commemorating the battle of Bunker Hill. It stands on the battle-ground on Breed's Hill (now Bunker Hill), Boston. The shaft is of Quincy granite 221 feet high with interior steps leading to an outlook at the summit. General Lafayette assisted in laying the cornerstone in 1825, on which occasion Daniel Webster delivered his famous dedicatory oration. The monument was formally dedicated in 1843, Webster being again the chief speaker.

BUN'NER, Henry Cuyler (1855-96). An American novelist and humorist; editor of *Puck* from almost its beginning till his death. He was born in Oswego and educated in New York, whither he came as a youth. After a brief experience of business life he essayed journalism on the staff of the short-lived *Arcadian*, and passed thence in 1877 to the editorial office of *Puck*, a journal to which he gave a certain dignity and authority in political matters, foreign to the usual standard of the comic press. His editorials were honest, independent, never rancorous, never cynical, never time-serving. His satire seemed to spring from knowledge. Those who winced felt that the writer was one of themselves. He could be counted on as a force for political honesty and social sanity, an enemy of all visionary schemes of Utopian agitators and socialistic extremists. But besides this editorial work, the memory of whose worth and power is slowly fading away, Bunner distinguished himself as a novelist, a story-writer, and a poet. Both *The Midge* (1886) and *The Story of a New York House* (1887) showed a sympathetic feeling for the artistic elements in New York life, but his genius was even more marked in short stories, admirable in their restrained pathos, unobtrusive humor, and simplicity of structure, barbed often with a political or social moral, and touched sometimes with an idyllic charm. Of several volumes of these stories, the most popular are *Zadok Pine* (1891); *Short Sixes* (1891); *More Short Sixes* (1894); *Love in Old Cloathes* (1896); and *Jersey Street and Jersey Lane* (1896). Of unique interest is *Made in France* (1893), stories adapted from Maupassant (q.v.), with a remarkable skill, that occasionally betters the French originals. Bunner's verses, which are marked by grace and charm, are collected in *Airs from Arcady* (1884) and *Rowen*. He wrote also a play, *The Tower of Babel* (1883). He died in Nutley, N. J., May 11, 1896.

BUN'NING, Herbert (1863—). An English composer and musical director. He was born in London, was educated at Brasenose College, Oxford, and in 1884-86 was a lieutenant of the Fourth Hussars. From 1886 to 1890 he studied music in France and Italy, and from 1895 to 1896 was director of music at the Prince of Wales's, London. His publications include a *Village Suite* (1896), for orchestra, and considerable instrumental and vocal music.

BUNSEN, bōōns'en, Christian Karl Josias, Baron (1791-1860). A German scholar and diplomatist. He was born August 25, 1791, at Korbach, in the Principality of Waldeck, and studied philology at Göttingen under Heyne. He taught in the Latin school there and was private tutor to W. C. Astor, of New York, with whom he traveled in Germany in 1813. To extend his knowledge of the Teutonic tongues, Bunsen went to Holland and afterwards to Copenhagen. The work and character of Niebuhr (q.v.) aroused his enthusiasm, and he spent some months of 1815 in Berlin in the company of the historian. In 1816 he went to Paris, and studied Persian and Arabic under Sylvestre de Sacy, and in the same year removed to Rome, where he married. Niebuhr, then Prussian Ambassador, took the greatest interest in the scientific pursuits of Bunsen, and procured (1818) his appointment as secretary to the embassy. While Friedrich Wilhelm III. was in Rome in 1822, he formed a favorable opinion of Bunsen's ability and character, and requested him to continue in the State service. On Niebuhr's departure from Rome (1824), Bunsen conducted the embassy provisionally for a time, and was then appointed Resident Minister (1827). Living in intimate intercourse with Niebuhr, Bunsen had employed the time in prosecuting his investigations into the philosophy of language and religion, and had made, on the one hand, the philosophy of Plato and the constitutions of antiquity, and, on the other, biblical inquiries, Church history, and liturgies, objects of special attention. Though not within the scope of the great plan of his life, he contributed largely to the *Beschreibung der Stadt Rom* (3 vols., 1830-43), the greater part of the topographical communications on ancient Rome, and all the investigations into the early history of Christian Rome. The first visit of the Egyptologist Champollion (q.v.) to Rome formed an epoch in Bunsen's antiquarian studies. He became him-

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self a zealous auditor of Champollion, and also encouraged Lepsius (q.v.) in the study of hieroglyphics. The Archæological Institute, established in 1829, found in Bunsen its most active supporter. He founded the Protestant hospital on the Tarpeian Rock in 1835. During his residence in Rome he contributed largely to the revision of the Lutheran liturgy.

In 1841 Bunsen was sent on a special mission to London and was shortly afterwards appointed Ambassador at the English Court. In Berlin, in 1844, he was asked to set forth his views on the question of granting a constitution to Prussia; and he presented a series of memorials representing the need of a deliberative assembly, and also made a plan of a constitution modeled on that of England. In the Schleswig-Holstein question, Bunsen strongly advocated the German view, in opposition to Denmark, and protested against the London protocol of 1850, although he was prevailed upon to sign that of 1852 respecting the succession in Denmark and Schleswig-Holstein. In the midst of all his political duties, Bunsen continued unabated his literary and philosophical pursuits, the results of which appeared from time to time. Because he differed from his Government as to the part Prussia should take in the Eastern Question (q.v.), Bunsen ceased in 1854 to represent Prussia at the Court of England, and retired to Heidelberg. He had a deep appreciation of English national characteristics. In England he was regarded by those who knew him as the most philosophical and most reverent of lay theologians. His chief works are: *De Jure Atheniensium Hæreditario* (1813); *Die Kirche der Zukunft* (translated into English, and published by Longman, 1845); *Ignatius von Antiochien und seine Zeit* (1847); *Die drei echten und die vier unechten Briefe des Ignatius von Antiochien* (1847); *Aegyptens Stelle in der Weltgeschichte* (translated into English by Cottrell, 1845-47); *Die Basiliken des christlichen Roms* (1843); *Hippolytus und seine Zeit* (1851); *Christianity and Mankind* (1854); *Gott in der Geschichte* (1857); and *Vollständiges Bibelwerk für die Gemeinde* (9 vols., 1858-70). This Bunsen hoped to make his chief work, but he only completed the first, second, and fifth volumes, the others being from his notes by Holtzmann and Kamphausen. Bunsen was created a baron in 1857, and died in Bonn, November 28, 1860. Consult *A Memoir of Baron Bunsen*, by his wife (London, 1868).

BUNSEN, FRANCES, Baroness (1791-1876). The wife of the preceding, of whom she published a biography under the title *A Memoir of Baron Bunsen, Drawn Chiefly from Family Papers, by His Widow, Frances, Baroness Bunsen* (1868). She was an Englishwoman by birth. Consult Hare, *Life and Letters of Frances, Baroness Bunsen* (London, 1882).

BUNSEN, ROBERT WILHELM (1811-99). A distinguished German chemist. He entered the University of Heidelberg and devoted himself to the study of geology, chemistry, and physics. He afterwards continued his studies in Paris, Berlin, and Vienna. After having held the post of professor in Cassel, Marburg, and Breslau, successively, he was, in 1852, appointed to the chair of chemistry at the University of Heidelberg, where he remained until 1889, when he retired from active service. Bunsen's discoveries have formed important contributions to the progress of science in the latter part of the Nineteenth Century. His discovery jointly with Kirchhoff, of the method of spectrum analysis, has led to the discovery of the alkali metals, cæsium and rubidium, and, more recently, of a number of other elements; with the aid of the spectroscope we are enabled further to analyze the fixed stars by analyzing the light we receive from them and ascertaining the lines characteristic of the several elementary substances composing the visible universe. Bunsen's flame tests (see ANALYSIS and FLAME) have formed another method in analytical chemistry, remarkable for its neatness and simplicity; the flame reactions are usually observed with the aid of the well-known burner of Bunsen's invention, which furnished a smokeless, non-luminous flame of high temperature; the principle of the Bunsen burner is now extensively utilized in the household for cooking purposes. Bunsen also carried out a series of interesting researches on the double cyanides; and the cacodyl (q.v.) groups discovered by him soon after Wöhler and Liebig had discovered the benzoyl group, served to confirm the idea that the nature of an organic compound depends upon the radicals of which it is composed—one of the fundamental principles of modern organic chemistry. He further devised a process for making the metal magnesium on a large scale and showed how to obtain an exceedingly brilliant light by burning magnesium wire; discovered the fact that hydrated oxide of iron is an excellent antidote for arsenic poisoning, etc. Only a few of his more important contributions to physical chemistry can be mentioned here. He investigated the absorption of gases by liquids at different temperatures and under different pressures; he showed that the melting temperature of substances which, unlike water, expand during the change from the solid to the liquid state, rises with increase of external pressure; he studied the chemical distribution of a given gas between two other gaseous substances, when exploded with a mixture containing an excess of either; invented the ice-calorimeter, which is often indispensable in thermochemical determinations; jointly with Roscoe, he adapted John W. Draper's actinometer for use in work of precision, and, by the use of the improved instrument, carried out, together with Roscoe, a series of important photo-chemical measurements. He invented also the filter-pump, a photometer, a galvanic cell which is extensively used in physical laboratories, and other useful apparatus. Among his publications may be mentioned: *Gasometrische Methoden* (1857); *Chemische Analyse durch Spektralbeobachtungen* (jointly with Kirchhoff, 1861); and *Flammenreaktionen* (1880).

BUNT (perhaps a corruption of *burnt*). A disease of wheat due to a parasitic fungus, *Tilletia tritici* or *Tilletia fœtens*. Bunt is also called *Stinking Smut*, *Pepper Brand*, and sometimes *Smut Ball*. Wheat attacked by this fungus assumes a bluish-green color and the plants never take on the characteristic color of ripened grain. The individual grains in the head are attacked, and if broken open will be found filled with black spores of a peculiar fetid odor, hence the name of stinking smut. It is one of the most common and injurious diseases of wheat, often affecting a great part of a crop, although its prevalence has been greatly diminished by care on

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the part of the farmers, and particularly by the selection of clean seed, and the dressing of the seed, before sowing, with some substance which, without injuring its vitality, destroys that of the spores of the fungus. Even washing with water has a good effect, but the best results are secured by treating the seed wheat with solutions of copper sulphate, formalin, or the Jensen hot-water method, as recommended for smut (q.v.). (See also DISEASES OF WHEAT.) Bunt is believed to be propagated by any contact of sound with unsound grain, by threshing, which causes the bunt spores to fly about, or by manure, in which the straw of infected grain has been mixed. Upon this knowledge the means now adopted for its prevention are founded. A considerable mixture of bunt is not supposed to render flour absolutely unwholesome, at least when made into fermented bread, but the bread is of peculiar flavor and very dark color.

BUNTER, bōōnt'ēr (shortened from Ger. *bunter Sandstein*, variegated sandstone). A series of rocks occurring in Europe, where it constitutes the lowest member of the Triassic System. In central England it includes mottled sandstones and conglomerates, with a maximum thickness of about 1700 feet, which rest unconformably on Permian and Carboniferous strata. The Bunter attains its greatest development in Germany, particularly in the Black Forest, the Vosges, and in the central and northern parts. Here the prevailing rocks are variegated sandstones and conglomerates, which grade toward the top into limestones and marls, and at the base pass insensibly into the Permian sandstone. They are divided into three stages: Lower Bunter—fine-grained, reddish sandstone, several hundred feet thick; Middle Bunter—coarse sandstone, about 1,000 feet thick; Upper Bunter—red and green marls of variable thickness, inclosing salt-beds. The Bunter is generally devoid of organic remains; footprints of amphibians and animal and plant fossils have been found, however, in both the English and German beds. The plant life included ferns, cycads, and conifers; the animal life was characterized by the prevalence of batrachians, the most typical forms being the labyrinthodonts. (See STEGOCEPHALIA.) Consult Geikie, *Text Book of Geology* (London, 1893).

BUNDER SANDSTEIN, bōōnt'ēr sänt'stīn. See BUNTER.

BUNTING (origin uncertain). A light, loosely woven woolen material, of which the flags and signals of ships are usually made, and which is also used for women's dress goods.

BUNTING (origin obscure). One of a group of seed-eating birds, sometimes classified as the family Emberizidæ, intermediate between the finches and the starlings. The most marked characteristics are a short, straight, conical bill, angular gape, and a hard, rounded knob on the inner surface of the upper mandible. The typical species is the British corn-bunting (*Emberiza miliaria*)—a bird considerably larger than a house sparrow, brown, with darker streaks on the upper parts, whitish brown, with spots and lines of dark brown on the under parts, and with a slightly forked tail. It is numerous, particularly in low-cultivated grounds, in most parts of Europe, extending also into Asia, living in pairs during spring and summer, but in flocks in winter and often visiting barnyards at that season, along with chaffinches and sparrows. This bunting often passes the night on the ground in stubble-fields, and is taken in the nets employed for catching larks, and brought with them to market. It usually builds its nest on or very near the ground. Its notes are harsh and unmusical. The reed-bunting (*Emberiza schœniclus*) is common in marshy situations; a very pretty little bird with black head and throat, strikingly contrasted with the white nape and sides of the neck. The cirl bunting (*Emberiza cirlus*), of which the head is olive-green, with black streaks and with patches of bright lemon-yellow on the cheeks and over the eyes, belongs chiefly to the south of Europe and the north of Africa. Other common European species are the yellow-hammer (*Emberiza citrinella*) and the ortolan (*Emberiza hortulana*), elsewhere described. The term is little used popularly in America, but applied in the older books to several more or less related birds, as the snow-bunting (q.v.), the black-throated bunting (see DICK-CISSEL), the bay-winged bunting (see VESPER-SPARROW), the lark-bunting (q.v.), the cow-bird, and bobolink. See Plate of BUNTINGS.

BUNTING. The Pied Piper of Hamelin, so named from his variegated attire.

BUNT'ING, JABEZ (1789-1857): An English Wesleyan minister, sometimes called the 'second founder of Methodism.' He was born in Manchester, and at the age of twenty entered upon ministerial work, in which he was very successful, holding charges successively in Manchester, London, Sheffield, Liverpool, and Leeds. He was president of the conferences of 1820, 1828, 1836, and 1844. In 1835 he was chosen president of the theological institution belonging to the Wesleyan Methodist body, and for more than twenty years was senior secretary of the missionary society in connection with his denomination. He was the chief authority in all matters relating to the government and policy of Wesleyan Methodism. He found the body without formal church organization, and gave it ecclesiastical discipline. He was an excellent administrator, and believed strongly in lay representation. Two volumes of his *Sermons* were published posthumously (1861-62).

BUN'YA-BUN'YA, or **BUN'YA.** See ARAUCARIA.

BUN'YAN, JOHN (1628-88). The author of *The Pilgrim's Progress*. He was born in Elstow, near Bedford, 1628. He was brought up to his father's trade of tinker, and spent his youth in the practice of that humble craft. It has generally been taken for granted that his early life was very loose and profligate, on the sole ground of his terrible self-accusations in after years, when, from the height of religious fervor and Puritan strictness, he looked back on dancing and bell-ringing as deadly sins. But there is no good reason for believing that he was really a bad character. He served for a short time (probably 1644-46) in the Civil War, and most likely on the side of Parliament; but beyond his taking some active part in the great struggle, nothing is precisely known. In 1648 or early the next year, he married, and through the influence of his wife and her 'godly books,' there was brought about a complete reformation in his life. In 1653 he joined the Nonconformist body of which she was a member, and two years

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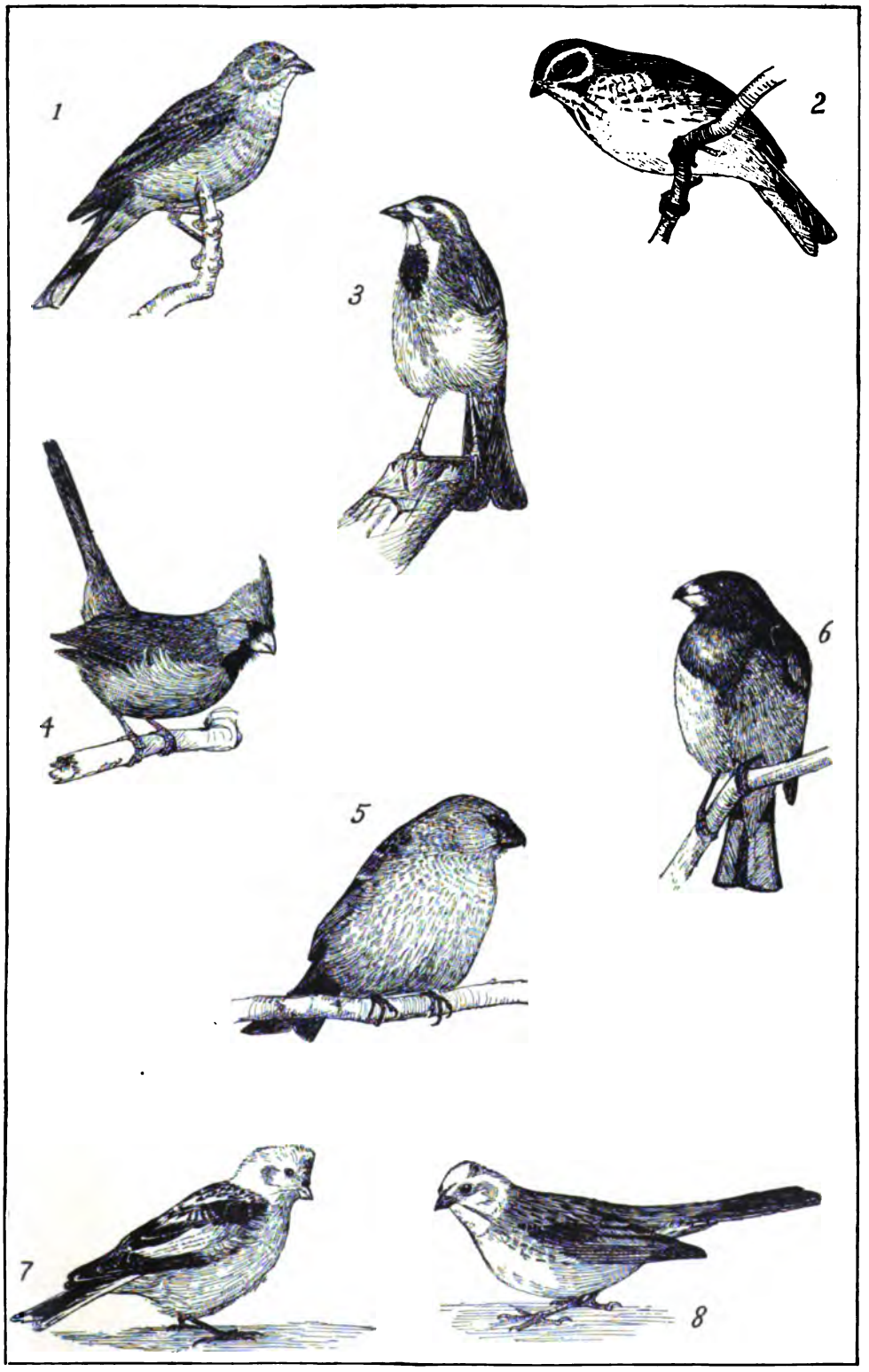
BUNTINGS AND GROSBEAKS



1. ORTOLAN (Emberiza hortulana).
2. REED BUNTING (Emberiza schœniclus).
3. DICK-CISSEL (Spiza americana).
4. CARDINAL GROSBEAK (Cardinalis cardinalis).
5. ROSE-BREASTED GROSBEAK (Habia ludoviciana).
6. PINE GROSBEAK (Pinicola enucleator).
7. SNOW BUNTING (Plectrophenax nivalis).
8. YELLOW BUNTING (Emberiza citrinella).

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ater he removed to Bedford. There the wife to whom he owed so much. In 1657 he was formally recognized as a preacher. "All the midland counties," says Froude, "heard of his fame, and demanded to hear him." After the Restoration it was made illegal to conduct divine service except in accordance with the forms of the Established Church. Bunyan, who persisted in his irregular preaching, was confined in Bedford County jail for twelve years (1660-72), though during a part of this time he was allowed a large degree of freedom. Here he supported his family—he had married again—by making tagged laces. His library consisted of the Bible and Fox's *Martyrs*. He was again imprisoned for six months in 1675, when he probably finished *Pilgrim's Progress*. After his enlargement his fame as a preacher increased more and more till his death, which took place in London, August 31, 1688. Though Bunyan is best known by *Pilgrim's Progress* (1st part 1678, 2d part 1684), he wrote much else. *The Life and Death of Mr. Badman*, which shows the rapid descent of a man from sin to sin, and *Grace Abounding*, a narrative of Bunyan's own spiritual life, are masterpieces in realistic literature, and *The Holy War* is a beautiful allegory. Among his sermons should not be forgotten "The Heavenly Footman." Editions of *Pilgrim's Progress* are numerous. A fac-simile reprint of the original edition was published (London, 1885). Consult: Brown, *John Bunyan, His Life, Times, and Works* (London, 1888); Froude, *John Bunyan* (New York, 1888); Venables, *Life of John Bunyan* (Oxford, 1888); and Macaulay's famous essay.

BUNZLAU, bōōnts'lou (from Slav. *Boleslas*, so named after its founder). A town of Prussia, in the Province of Silesia, situated on the Bober, about 60 miles west-northwest of Breslau (Map: Prussia, F 3). An obelisk to the Russian General Kutusoff, who died here in 1813, adorns the market-place. Its manufactures include tiles, pottery, glass, and linen. There are also stone-cutting establishments, iron-foundries, and saw-mills. It is the birthplace of the poet Martin Opitz. Population, in 1890, 12,921; in 1900, 14,600.

BUOL-SCHAUENSTEIN, bōō'ôl shou'enstīn, KARL FERDINAND, Count (1797-1865). An Austrian statesman. After filling subordinate diplomatic posts, he became Ambassador at Karlsrühe in 1828; Stuttgart in 1838; and Turin in 1844. Leaving Turin on the outbreak of the war in 1848, he went as Ambassador to Saint Petersburg. In 1851 he represented Austria in London. On Schwarzenberg's death, Buol-Schauenstein was recalled to Vienna, and became Foreign Minister. In carrying out the wavering policy of Austria in relation to the Eastern question, he succeeded only in materially reducing that country's influence in European affairs, and showed himself a weak disciple of Metternich and Schwarzenberg. (See CRIMEAN WAR.) After defending in diplomatic notes and circulars the position which Austria had taken with reference to Sardinia Buol-Schauenstein suddenly, on the actual commencement of the Italian campaign of 1859, resigned his place, which was filled by Count Rechberg. He died October 28, 1865.

BUONAROTTI, bwō'nâ-rŏt'tê, FILIPPO (1761-1837). An Italian revolutionist, born in Pisa. He was a devoted follower of Rousseau. In 1787 he founded a journal antagonistic to the Government of Tuscany, and was banished. He then withdrew to Corsica, where he established the paper entitled *L'Ami de la Liberté italienne*. He brought about the annexation of the island of San Pietro to the Republic of France, and became a French citizen, and subsequently the founder and president of the Pantheon Society, which aimed at a restoration of the Constitution of 1793. Upon the dissolution of this society by the Directory he became implicated in the conspiracy of Babeuf, and was sentenced to deportation, but afterwards was pardoned. He died in comparative obscurity.

BUONARROTI, bwō'när-rō'tê, MICHELANGELO. See MICHELANGELO.

BUONCOMPAGNI, bwōn'kôm-pä'nyê, BALDASSARE, Prince (1821-94). An Italian scholar. He was born in Rome, and was a descendant of the Princes of Piombino, who count among their members several cardinals and Pope Gregory XIII. In 1847 he became a member of the Pontifical Academy de' Nuovi Lincei, of which he was afterwards appointed secretary and librarian. He published the following important works: *Della vita e delle opere di Guidone Bonatti, astrologo ed astronomo del secolo decimoterzo* (1851); *Della vita e delle opere di Leonardo Pisano* (1852); *Intorno all' opera d'Albiruni sull-India* (1869).

BUONFIGLIO, bwôn-fē'lyô, BENEDETTO. See BONFIGLIO.

BUONONCINI, bwō'nŏn-chē'nê, GIOVANNI BATTISTA. See BONONCINI.

BUONTALENTI, bwōn'tâ-lĕn'tê, BERNARDO, called BERNARDO DELLA GIRANDOLE (1536-1608). An Italian painter and architect. He was born in Florence and studied with Bronzino, Vasari, Salviati, and Michelangelo. Although extremely versatile, he acquired fame chiefly through his splendid architectural works in the form of villas, artificial fountains, palaces, bridges, and fortifications. Among these may be mentioned the façade of Santa Trinità in Florence, the Palazzo Reale in Siena, and the palace of the Grand Duke in Pisa. He was one of the foremost exponents of the baroque style of Italy, and several of the most celebrated buildings of Florence and Pisa were designed or completed by him.

BUOY, bōō'ĭ, or **BOY**, boi (OF. *boye*, fetter, chain, Lat. *boia*, leather collar, Gk. *βόειος*, *boeios*, of ox-hide, from *βοῦς*, *bous*, ox; alluding to its being fastened by a chain). A floating body intended as a mark for the limits of a channel, the position of a shoal, rock, wreck, or the like. It is made either of wood or metal. Buoys are moored by chains to heavy anchors or weights. It is the custom in northern latitudes, where more or less ice is expected in the winter season, to replace the hollow metal buoys by wooden *spar buoys* until the ice has disappeared, as there is less danger of the spar being swept away or damaged. Buoys are of different kinds and shapes, according to the purposes they are intended to serve—as *can buoys*, made of sheet iron, in the form of a cylinder, with a hemispherical base; *spar buoys*, made of a wooden spar or log which is anchored at one end; *nun buoys*, which are conical above water; *bell buoys*, surmounted by a bell which is rung by

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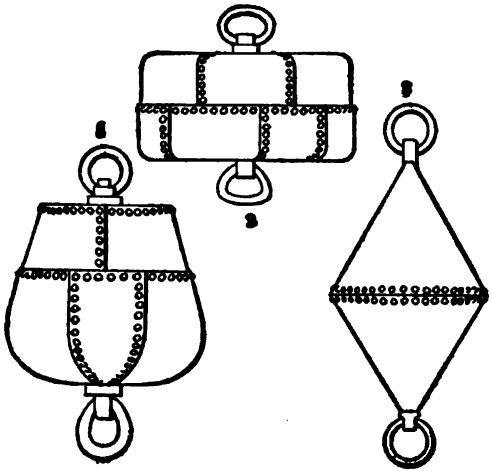
the action of the waves (there is no clapper, but iron balls roll about on a plate under the bell's mouth, and striking against the inner surface of the bell, make a noise that can be heard at a considerable distance); and *whistling*

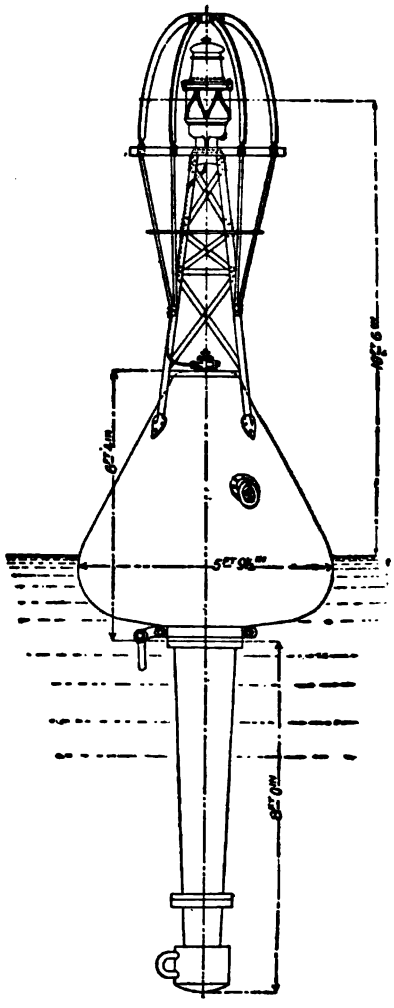


1 AND 2, CAN BUOYS; 3, NUT OR NUN BUOY.

buoys, which are fitted with an apparatus by which air compressed by the movements of the waves is made to escape through a whistle, and so gave warning of danger. Cages or shapes are sometimes put on buoys as further marks of distinction.

In the United States the following system of placing buoys as aids to navigation is prescribed by law: *Red* buoys mark the starboard or right-hand side of a channel when coming from seaward, and *black* the port or left-hand side; mid-channel dangers and obstructions are marked with *danger buoys*, having black and red transverse stripes, and *mid-channel* buoys marking the fairway have longitudinal black and white stripes; and *wreck buoys* marking sunken wrecks are painted green; *buoys marking anchorage limits or dumping limits* are painted white. The *quarantine buoy*, if there be one, is painted yellow. The starboard and port buoys are numbered from the seaward end of the channel in large white or black numbers, odd white numbers on the black buoys, and even black numbers on the red. The *life buoy* now in common use in the navy consists of a hollow copper ring having on each side a long tube swinging freely on a pivot and weighted so as to keep in a vertical position. In the bulb at the bottom there is a burning composition which takes fire upon contact with the water, the gas burning at the top of the tube with a bright flame which can be seen at a considerable distance at night. This machine is hung over the side of the vessel near the stern, and is dropped by means of a trigger.

An *anchor buoy* is a small metal buoy made fast to the anchor by means of a rope, and it is used to mark the position of the anchor, so that should the riding-chain (the chain the ship hangs by) part, the whereabouts of the anchor is still indicated by the buoy, and it may be recovered. *Gas buoys* are used for marking certain important channels, thus permitting the safe entrance and exit of vessels at night. They are provided with a reservoir of compressed illuminating gas under a pressure of 150 to 190 pounds per square inch, which is sufficient to last from 85 days to a year, according to the size of the buoy and the degree of compression of the gas. The cost is estimated at less than seven cents per day (the light is not extinguished night or day) and the reservoir may be filled in a few minutes by means of a hose



GAS BUOY.

leading from the gas-tanks of the supply steamer or buoy-tender. The body of the buoy is sufficiently large to give proper buoyancy, and is held upright by a centre weight at the bottom. On top of it there is a wrought-iron tower, about 6 feet high, upon which is mounted a Fresnel lens lantern, which is protected by a wire cage. A filling valve and a regulating valve are provided. The lanterns may be so made as to give flashes of different duration or of different colors. They may be seen from 6 to 8 miles. *Electrically lighted buoys* have been used in United States harbors since 1888. They

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have replaced gas buoys in certain localities, particularly when there is much floating ice, for the electric lights may be placed on the ends of spars designed specially for winter service. The cables require protection or armoring, but if properly equipped electric buoys give good results.

BUOYANCY (for derivation, see BUOY). The quality which causes a body to float or tend to float in a liquid, and depends upon the relative densities of the liquid and body. The centre of buoyancy is the point at which all forces which produce the buoyant effort (i.e. those which resist the tendency of an object to sink) may be considered to act. When the floating object is at rest in stable equilibrium, the centre of buoyancy is in the same vertical line as the centre of gravity and at a distance above it. See STABILITY; HYDROSTATICS.

BU'PALUS (Gk. Βούπαλος, *Boupalos*) and **ATHE'NIS** (Ἀθηνίς). Sons of Archennus of Chios, famous sculptors of the time of Hipponax (B.C. 540). They are said to have made a caricature of the poet, who retorted with verses of bitter satire.

BUPHO'NIA (Gk. *τὰ βουφόνια, ta bouphonia*, from *βοῦς, bous*, ox + *φόνος, phonos*, slaughter). An ancient Greek sacrificial ceremony, consisting of the slaying of an ox, performed at the Zeus festival Dipolia, on the fourteenth day of the month Scirophorion, which corresponded to the last part of June and the first part of July.

BUQUITNON, bōō-kēt'nŏn. A name of the wild Visaya people on Negros Island; not the Buquidnon of Mindanao. See PHILIPPINES.

BUR. The slight ridge of metal raised on the edges of a line engraved either by the burin or by the dry point. This is removed usually by a scraper, as it retains too much ink in printing the plate and produces the effect of a blur or a smear. Seymour Hayden and other etchers often retain it for enriching their shadows. Plates by Rembrandt show that he also made use of it for this purpose. See ENGRAVING.

BURANO, bōō-rä'nô. A city in North Italy, 5 miles northeast of Venice, on an island of the same name in the Lagoons (Map: Italy, G 2). The chief industries are market-gardening, boat-building, and fishing; the women are employed in lace-making. To Burano belongs Torcello, on an adjacent islet, with two museums of antiquities, and a cathedral built in the Seventh Century, rebuilt in 864, and partially rebuilt in 1008, and containing valuable mosaics. Of interest to architects is the octagonal Twelfth Century Church of Santa Fosca. Population, in 1881 (commune), 6800; in 1901, 8169.

BURBAGE, bûr'bĭj, or **BURBADGE**, RICHARD (c.1567-1619). An English actor. He was the son of James Burbage, the first actor to receive a royal license (1574). Richard made his début about 1588, and in 1599 he built the famous Globe Theatre, Shakespeare being one of his business associates. He and his brother and sister also owned the Blackfriars Theatre, where he acted till his death, taking leading rôles in the best plays of the period, and being especially noted for his Richard III. The Felton portrait of Shakespeare (now owned by the Baroness Burdett-Coutts) is attributed to him.

BUR'BANK, ALFRED POST (1846-94). An American elocutionist. He was born in Chicago, and received his education at the university in that city. At the age of 17 he enlisted in the army, and served in Tennessee. He afterwards devoted himself to teaching, and was long associated as principal with the Dearborn and Douglas public schools of Chicago. Afterwards he made frequent tours as a professional reader through every portion of the United States, and also visited London. As an actor he appeared successfully in the *Claimant*, by Mark Twain, and in Pinero's *Sweet Lavender*. His most effective work, however, was done as a reader and impersonator. He was especially successful in his impersonation of Dickens's characters, notably those in *Nicholas Nickleby* and *A Tale of Two Cities*.

BURBANK, LUTHER (1849—). An American horticulturist, the originator of new varieties of fruits, flowers, and vegetables. He was born on a farm at Lancaster, Mass., and was educated in the academy of that town. In 1875 he moved to Santa Rosa, Cal., where he established an experimental farm. He has originated the Burbank potato; Gold, Erickson, Apple, October Purple, Chalco, America, and Climax plums; Giant, Splendor, and Sugar prunes; Peachblow, Burbank, and Santa Rosa roses; Giant and Fragrance callas; besides numerous varieties of other plants.

BUR'BON. A character in Spenser's *Faerie Queene*, a noble knight who is beset by a throng of common folk, but who makes his escape and rescues his mistress. In the allegory he stands for Henry IV. of France, who escaped, together with his bride, from the massacre that took place during his nuptial festivities, August 24, 1572, in Paris. See BARTHOLOMEW, MASSACRE OF SAINT.

BURBOT (corruption of Fr. *barbote*, from Lat. *barba*, beard, referring to its barbels). The only fresh-water fish (*Lota lota*) belonging to the Gadidæ, a family including the cod, haddock, pollock, etc. It occurs in certain rivers of England, northern Europe, and in Asia. It never enters salt waters. It may grow to a weight of 12 pounds, but in English waters it is usually about one-fifth as great. The burbot, like the ling (q.v.), has an elongated form; the head is rather broad, and the tapering posterior of the body compressed. It is covered with very small, imbedded scales. The mouth is large, and the chin has a well-developed barbel. The first of the two dorsal fins is short, the second very long, and the anal fin is also very long. The caudal fin is rounded. The American burbot (*Lota maculosa*), which occurs in the lakes and sluggish streams of the northern and eastern portions of America, is probably identical with the European burbot. It is a coarse and tasteless fish and not much used as food.

BUR'BRIDGE, STEPHEN GANO (1831-94). An American soldier. He was born in Scott County, Ky., and was bred to the law, but engaged in mercantile business and farming. When the Civil War began he entered the Union service, and was distinguished for bravery in many engagements. He was promoted brigadier-general of volunteers at Shiloh, and earned the brevet

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rank of major-general of volunteers by defeating General Morgan and his raiders in 1864. He resigned in 1865, and retired to private life in Kentucky.

BUR'CHARD, SAMUEL DICKINSON (1812-91). An American Presbyterian clergyman, born in Steuben, N. Y. He graduated at Centre College in 1836, and soon became prominent in Kentucky as an anti-slavery and temperance lecturer. He became pastor of the Houston Street Presbyterian Church in New York City in 1839, and of the Murray Hill Church in 1879, but in 1885 he withdrew from active work, and became pastor emeritus. On October 29, 1884, toward the end of the bitter Blaine-Cleveland Presidential campaign, he was the spokesman of a large party of clergymen of all denominations, who waited upon Blaine at the Fifth Avenue Hotel in New York City to assure him of their support. Toward the end of his generally temperate address, he characterized the Democratic Party as the party of 'Rum, Romanism, and Rebellion.' This unfortunate alliteration, which Blaine did not at the time take the pains to repudiate, was immediately made use of by the Democrats as campaign material. The words were printed on leaflets which were spread broadcast among the voters, flaring placards, ringing endless changes on the letters 'R. R. R.,' were exhibited in all the large cities, and the Democratic press persistently attributed the sentiment to Blaine himself and charged him with being a rabid anti-Catholic. It is generally believed that the phrase alienated enough Catholic voters in New York State alone, where the Democratic majority was only 1047 votes, to turn the national election, which hinged on the electoral vote of New York, to Cleveland.

BURCHARDI, bŭrk'är-dē, GEORG CHRISTIAN (1795-1882). A German jurist. He was born at Ketting, in the island of Alsen, and was educated at the universities of Kiel, Berlin, and Göttingen. His numerous contributions to the history and the nature of Roman law are important. His principal publication is *Die Wissenschaft und Kunst der Rechtsfindung* (1869).

BUR'CHELL, WILLIAM JOHN (c.1782-1863). An English explorer and naturalist, born in Fulham. He was 'schoolmaster and acting botanist' on the island of Saint Helena for the East India Company, from 1805 to 1810, and then proceeded to South Africa. Here in the course of several years of solitary exploration he accumulated a collection of 63,000 natural objects, 500 drawings, and much material on astronomical, meteorological, and other subjects. Many of the specimens collected on this journey are now in the British Museum. In 1825 he made an extended tour through South America, where also he was generally unattended. He proceeded through the Province of Goyaz as far as Porto Real and Para. The entomological collection alone, which he accumulated on this journey, is said to have been eight or nine times as large as that previously made in Africa. In recognition of his valuable services to science, many of the animal and vegetable species discovered by him were named in his honor. See ZEBRA in colored Plate of HORSES.

BURCHIELLO, bōōr-kyĕl'lō, DOMENICO (c.1390-1448). An early Italian satiric poet, whose real name seems to have been Domenico di Giovanni. He is known to have kept a barber shop in Florence, which was a favorite place of meeting, for a circle of artists and men of letters, among them Leon Battista Alberti and Giovanni Aquettini da Prato. Subsequently he lived in great poverty in Siena, and finally died in Rome in 1448. Burchiello is interesting as illustrating the type of burlesque poetry prior to Francesco Berni. His favorite form was the *sonnetto caudato*, or sonnet with a tag of three extra lines. His poems are often tinged with vulgarity and are written so largely in the current slang of his day that they would scarcely be intelligible now, even aside from the references to people and places long since forgotten. In 1553 they had already become so obscure that the efforts of his first commentator, Doni, to explain them make strange and curious reading. Of the numerous editions of his sonnets, may especially be mentioned: *Sonnetti del Burchiello, del Bellincioni e d'altri poeti fiorentini* (London, 1757). Consult Gargani, *Sulle poesie del Burchiello* (Florence, 1877).

BURCKHARD, bōōrk'härt, MAX EUGEN (1854—). An Austrian poet and writer on jurisprudence, born in Korneuburg. After university study in Vienna, he became a member of the Ministry of Education, and in 1890 director of the Vienna Court Theatre, on whose blacklist he placed the dramas of Ibsen, Hauptmann, and Sudermann. His publications include, in verse, *Das Lied vom Tannhäuser* (1888), and, in prose, *System des österreichischen Privatrechts* (1883-89) and *Lesetze und Verordnungen in Kultussachen* (1887; 3d ed., 2 vols., 1895).

BURCKHARDT, HEINRICH (1811-79). A German forester, born in Adelebsen. He studied at the University of Göttingen, and entered the Government service of Hanover as an under-forester. In 1858 he was appointed director of forests as a member of the Ministry of Finance. When Hanover was consolidated with Prussia (1866) he was retained as a Prussian chief ranger. He wrote *Forstliche Hilfstafeln* (3 pts., 1852-58); *Säen und Pflanzen* (1855; 6th ed., Trieves, 1892); and *Der Waldwert in Beziehung auf Veräusserung* (1860).

BURCKHARDT, JAKOB (1818-97). A Swiss historian. He was born in Basel, studied at the universities of Basel and of Berlin, and was appointed professor of the history of art and civilization in the former. He afterwards taught a few years at the Polytechnic Institute of Zürich. His works, characterized alike by thorough research, sound learning, and an excellent style, include *Jakob von Hochstaden, Erzbischof von Köln* (1843); *Die Zeit Konstantins des Grossen* (1853); *Cicerone* (1855; 6th ed. by W. Bode, 1893), a kind of guide-book, containing a history of art in Italy, together with descriptions of the more important art-works of that country; *Die Kultur der Renaissance in Italien* (6th ed., 1898); and a valuable *Geschichte der Renaissance in Italien* (3d ed., 1890-91).

BURCKHARDT, JOHANN KARL (1773-1825). A mathematician and astronomer, born in Leipzig. He studied at the University of Leipzig, pursued a course in astronomy under Zach in Gotha, and was appointed assistant astronomer in the Bureau des Longitudes, Paris. In 1807 he became the director of the observatory of the

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Ecole Militaire. His treatise on the comets of 1770 was crowned by the Academy. His lunar tables (1812) were long the best. He translated into German a part of Laplace's *Mécanique Céleste* and published several valuable astronomical treatises.

BURCKHARDT, JOHN LEWIS (1784-1817). An explorer in the service of the African Association of London. He was born in Lausanne, Switzerland, of English parentage, was educated in Leipzig and Göttingen, and in 1806 went to London, where he was introduced by Sir Joseph Banks to the African Association, which sent him to explore the interior of Africa. From Malta he proceeded, under the disguise of an Oriental, to Aleppo, where, within two years, he became so proficient in the vulgar Arabic that he could safely travel as an Oriental merchant. He visited Palmyra, Damascus, and the Lebanon, and went through Palestine to Cairo. In 1814 he traveled through the Nubian Desert to the shore of the Red Sea and then from Jidda proceeded to Mecca and visited the Prophet's tomb at Medina. In 1815 he returned to Cairo, and in the following year ascended Mount Sinai. Just as he was about to set out from Cairo on a journey to Sudan, he was seized with dysentery and died within a few days. As a holy *sheik*, he was buried with all funeral honors by the Turks in the Moslem cemetery. His collection of Oriental MSS., in 350 volumes, was left to the University of Cambridge. His journals of travel, remarkable alike for their interest and evident truthfulness, were published by the African Association. He published *Travels in Nubia* (1819); *Travels in Syria and the Holy Land* (1822); *Travels in Arabia* (1829); *Notes on the Bedouins and Wahabys* (1830); and *Arabic Proverbs* (1830).

BURCKMAIR, or **BURGKMAIR,** bōōrk'-mīr, HANS (1473-1531). A German painter and wood-engraver. He was born in Augsburg, and was the brother-in-law of the elder Holbein, and the friend of Albert Dürer, whose influence is manifest in his works. Several excellent paintings by him are preserved in the galleries of Munich, Berlin, Augsburg, and Vienna. He is best known, however, as a wood-engraver, his cuts numbering nearly 700. Among the most celebrated of these is his "Triumph of the Emperor Maximilian I.," in 135 cuts, with a description by the Emperor himself. Another fine series of 237 cuts, called "The Wise King," represents the deeds of Maximilian.

BURDACH, bōōr'dăĊ, KARL FRIEDRICH (1776-1847). A German physiologist, born in Leipzig. He was graduated in medicine there in 1800; became professor of physiology in the University of Dorpat in 1811, and four years later took a similar position in Königsberg. Among his numerous works is *Die Physiologie als Erfahrungswissenschaft* (1826-40).

BUR'DEKIN. A river in northeastern Australia, in the State of Queensland (Map: Queensland, E 6). It is 350 miles long, and flows into Upstart Bay, on the Pacific Ocean.

BURDEN (AS. *byrfen*, Icel. *byrfr*, Ger. *Bürde*, load, from the root of *bear*, AS. *beran;* cf. Gk. *φόρτος*, *phortos*, load, from *φέρειν*, *pherein*, to carry). A term of broad significance, equivalent in meaning, in general, to charge, obligation, incumbrance, servitude, etc.; as, burden of proof (*onus probandi*); burden upon lands, etc. The term is the one ordinarily used in the law of Scotland to signify any restriction, limitation, or incumbrance affecting either person or property, the burden being called *real* when it is a charge upon lands themselves, and otherwise *personal*, the term, as thus used, being substantially equivalent to the term obligation (q.v.) in English and American law, and the phrase *real burden* to servitude, or incumbrance (q.v.).

BURDEN, HENRY (1791-1871). An American inventor and manufacturer. He was born in Scotland, studied science and engineering in Edinburgh, and came to the United States in 1819. The next year he invented and patented the first cultivator used in agriculture in this country. His inventions include improvements in plows; a machine for making iron spikes by which the cost of railroad-building was greatly reduced, and one for making horseshoes, which produced sixty shoes per minute from the bar. He was for many years proprietor of the Troy Iron and Nail Works, one of the largest manufactories in the world.

BURDEN OF PROOF, or ONUS PROBANDI. This term has two significations in the law of evidence. First it means the obligation resting upon the party having the affirmative of the issue in a litigation to prove his case. In this sense, the burden of proof is generally upon the plaintiff. If, however, the defendant sets up an affirmative defense, the burden is upon him. An example of such a defense is afforded when an insurance company, sued upon a marine insurance policy, sets up as its only defense the unseaworthiness of the insured ship. In such a case the defendant has the burden of proving that the ship was unseaworthy. Second, the term means the obligation to give evidence at some particular stage of the trial. For example, if the party having the affirmative of the issue has given evidence enough to entitle him to a judgment, the burden of giving further evidence rests upon his opponent. When the term is used in this sense, it is proper to say that the burden of proof shifts from one party to the other during the trial. When used in the first sense, it is incorrect to say that the burden of proof shifts. The burden of making out his case is always upon him who has the affirmative of the issue. Hence, in a criminal case, it is always upon the Government, which is also bound to make out its case, i.e. to establish the guilt of the prisoner beyond a reasonable doubt. In civil cases, the one having the affirmative of the issue makes out his case if he convinces the jury that the preponderance of proof is on his side. Consult Thayer, *Preliminary Treatise on Evidence at the Common Law* (Boston, 1898). See EVIDENCE; PROOF.

BURDETT', Sir FRANCIS (1770-1844). An English liberal politician. He was born January 25, 1770, and was educated at Westminster and Oxford. He spent some years on the Continent, and was a witness to the progress of the first French Revolution. In 1793 he married Sophia Coutts, heiress of the wealthy London banker; in 1796 was elected member of Parliament for Boroughbridge, Yorkshire, and in 1797 succeeded to the baronetcy. He made himself conspicuous by his opposition to the Government and the French War; advocated Parliamentary reform, Catholic emancipation, and other liberal measures, and as an effective polit-

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ical speaker, for many years was the idol of the London populace. Having obtained a Parliamentary inquiry into the abuses of the metropolitan prisons, he was returned in 1807 for Westminster, which he represented for nearly thirty years. Burdett, in 1810, published, in Cobbett's *Political Register*, a letter to his constituents, declaring the conduct of the Commons illegal in imprisoning John Gale Jones, a radical orator, who had questioned their authority in excluding strangers from the House. The Speaker issued a warrant for Burdett's arrest as guilty of a breach of privilege. Refusing to surrender, he for two days barricaded his house, the populace supporting him in his resistance; but on April 9, the sergeant-at-arms, aided by the police, obtained an entrance, and conveyed him to the Tower. The prorogation of Parliament restored him to liberty. Prosecuted in 1819 for a letter on the 'Peterloo massacre,' strongly condemning the authorities, he was sentenced to three months' imprisonment and a fine of £2000. In 1835 he joined the Conservatives, and in 1837 was returned for Wiltshire, which he represented till his death, January 23, 1844. Burdett maintained the freedom of public speech in England by a fearless and unflinching attitude against all attempts at suppression.

BURDETT-COUTTS, bûr-dĕt′ kōōts′, Angela Georgina, Baroness (1814—). An English philanthropist, daughter of Sir Francis Burdett. In 1837 she inherited much of the property of her grandfather, Thomas Coutts, the banker. The liberal and public-spirited use she has made of this wealth, in her efforts to mitigate the sufferings of her fellow-creatures and the lower animals, has rendered her name well known in England and America. Besides spending large sums in building and endowing churches and schools, she endowed the three colonial bishoprics of Cape Town, Adelaide, and British Columbia, at an outlay of about £50,000, and founded an establishment in South Australia for the improvement of the aborigines. In her zeal for the good of her own sex she effected important reforms in the teaching of girls at the national schools, and established a shelter and reformatory for fallen women. To the city of London she has presented, besides several handsome fountains, the Columbia Market, Bethnal Green, for the supply of good and wholesome food in a poor district. She also built Columbia Square, consisting of model dwellings at low rents for about 300 families; and, taking great interest in emigration, has assisted many poor families in their passage. Her private charities have been on a corresponding scale, and she is also a liberal patroness of art. In 1871 she accepted a peerage from the Government, with the above title. In 1872 the freedom of the city of London was conferred upon her (the first woman who ever received it), and in 1874 the freedom of Edinburgh. She was married in 1881 to W. L. Ashmead-Bartlett (born in New Jersey), who by royal license used the surname Burdett-Coutts.

BURDETTE, Robert Jones (1844—). An American humorist and clergyman, who became famous through his paragraphs in the Burlington (Iowa) *Hawkeye*. He was born in Greensboro, Pa., and received a secondary school education in Peoria, Ill. During the Civil War he served as a private soldier. In 1869 he became night editor of the *Peoria Daily Transcript*, and afterwards was associated with other papers. He joined the staff of the *Burlington Hawkeye* in 1872, and his humorous paragraphs soon began to be quoted in newspapers throughout the country, with the result that, beginning in 1876, he made a number of very successful lecture tours. He became a licensed minister of the Baptist Church in 1887, and afterwards took charge of the Baptist chapel at Gladwyne, Montgomery County, Pa. His books include: *The Rise and Fall of the Mustache and Other Hawkeyetems* (1877); *Hawkeyes* (1880); *Life of William Penn* (1882); *Innach Garden and Other Comic Sketches* (1886); and *Chimes from a Jester's Bells* (1897).

BUR′DICK, Francis Marion (1845—). An American professor of law. He was born at De Ruyter, N. Y., graduated at Hamilton College in 1869, and in 1872 at Hamilton College Law School, and from 1872 to 1883 practiced law. He was Mayor of Utica, N. Y., from 1882 to 1883, professor of law and history in Hamilton College from 1882 to 1887, and professor of law in the law school of Cornell University from 1887 to 1891. In 1891 he was appointed professor of law in Columbia University. He has published: *Cases on Torts; The Law of Sales;* and other legal works.

BURDOCK (*bur*, the globular seed-case + *dock*, the plant; see Dock) (*Arctium*). A genus of plants of the order Compositæ. The heads of flowers are globose, or nearly so, and each of the scales of the involucre runs out into a long, rigid prickle, which is hooked at the point. By means of these hooks the flower-head—popularly called a bur—readily lays hold of the clothes of a passer-by, the wool of a sheep, or the like, and thus the seeds are transported from one place to another. The common burdock (*Arctium lappa*) is abundant in waste and bushy places, by waysides, etc., in Europe, and is naturalized in the United States. Its root is biennial, large, and fleshy, somewhat carrot-shaped; the root-leaves large, stalked, heart-shaped; the stem stiff, upright, somewhat branched and leafy, 3 feet or more high. The root is sometimes used in medicine, being diaphoretic and diuretic, and acting upon the cutaneous system and the kidneys. It is capable of being made a substitute for sarsaparilla. In autumn young roots are often found to contain as much as 45 per cent. dry weight of inulin. In many countries the roots, young shoots, and young leaves of burdock are used in soups, and the plant is cultivated for this use in Japan. The roots are said to resemble artichokes in taste. The leaves and their expressed juice are sometimes applied to burns and suppurations.

BURDWAN, bûrd-wän′. See Bardwan.

BUREAU (Fr., from OF. *burel*, coarse woolen cloth, because a bureau was originally covered with brown baize). A writing-table or desk with drawers. The use of the French word in this sense is at least as old as Swift, and became common in England in the latter half of the Eighteenth Century. In America it is used to signify any chest of drawers. The word is also applied to an office for transacting business,

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and hence to a department of public officials. Bureaucracy is, accordingly, a government by office-holders characterized by adherence to official traditions and 'red tape.' For the history of the article of furniture, consult Viollet-le-Duc, *Dictionnaire raisonné du mobilier français* (Paris, 1858-75).

BUREL, or BUREAU (OF. *burel*, a coarse cloth, russet-colored, from Lat. *burrus*, dark red, Low Lat. *burra*, coarse red cloth). A cloth, generally of coarse texture, manufactured in England in the Middle Ages for cloaks and other outer garments.

BURETTE, bu-rĕt' (Fr., little vase, from OF. *buire*, flask, from Lat. *bibere*, to drink). A measuring apparatus invented by Gay-Lussac, and much used in chemical laboratories. It consists of a graduated glass tube terminating in a narrow opening. By means of an attachment, as a stop-cock or rubber tube with a spring clamp, a liquid contained in the burette may be drawn off by drops. The burette is usually employed when it is necessary, for analytical purposes, to use precisely measured volumes of liquid reagents.

BURG, bōōrk (Ger., fort—it is a walled town). A town of Prussia, in the Province of Saxony, situated on the Ihle, about 13 miles northeast of Magdeburg (Map: Prussia, B 2). It has long been famous for its extensive woolen manufactures. It has also manufactures of gloves, shoes, starch, and tobacco, dye-works, tanneries, brick-kilns, distilleries, foundries, etc., and a large trade in farm produce. Population, in 1890, 17,500; in 1900, 22,500.

BURGAGE TENURE (from OF. *bourgaze*, Med. Lat. *burgazium*, from *burgus*, borough). A form of tenure of real property which prevails both in England and Scotland, although somewhat differently regarded in these two countries. In England it is a variety of socage (q.v.) tenure, and obtains where the King or other person is lord of an ancient borough in which the tenements are held by a certain and determinate rent. Burgage tenures are characterized by a variety of curious customs, affecting the alienation and inheritance of the lands so held, and differentiating them from the more usual common-law tenures. Such, for example, is the custom that the wife shall be endowed with all her husband's tenements, and not with the third part only, as at common law. In Scotland, by this tenure is meant a peculiar sort of military holding affecting property in royal burghs, the sovereign being superior or over-lord, and each individual proprietor or burgess holding direct of the Crown, for the *reddendo*, or service, of *watching* and *warding* (q.v.). This service is now merely nominal. If the burgh, as such, ceases to exist, the Crown does not thereby lose its rights over the proprietors, for they continue as Crown vassals (q.v.). The statutes 31 and 32 Vict. c. 101, and 32 and 33 Vict. c. 116, abolished many useless forms of this tenure. (See TENURE.) Consult: Blackstone, *Commentaries on the Laws of England;* Pollock and Maitland, *History of English Law* (2d ed., Boston, 1899); Stephen, *New Commentaries on the Laws of England.*

BURGAS, bōōr-gäs' or **BOURGAS**. A seaport town of Eastern Rumelia, situated on the bay of the same name, about 76 miles northeast of Adrianople (Map: Turkey in Europe, F 3). Burgas is the terminal of the Sofia-Burgas Railway, and contains several mosques and Christian churches. It carries on some trade in grain and animal products. Population, in 1901, 11,700, chiefly Bulgarians.

BURGDORF, bōōrk'dôrf (Fr. *Berthoud*, in local patois *Burtlef*, founded by Berthold V.). A town in the Swiss Canton of Bern, situated on the Emme, 14 miles from Bern. It is over 1800 feet above sea-level, and consists of a lower and upper part, which are connected by spiral streets (Map: Switzerland, B 1). There is an ancient castle in which Pestalozzi had his school for a number of years. The town contains also ribbon, tobacco, and chocolate manufactories, and carries on a large trade in dairy products. Population, in 1900, 8400.

BÜRGEL, bur'gel, KONSTANTIN (1837—). A German composer. He was born in Liebau, Silesia; studied under Brosig in Breslau, and Kiel in Berlin; and in 1869-70 was an instructor in Kullak's Neue Akademie der Tonkunst in Berlin. He then became a private teacher of pianoforte method. His compositions include a suite and variations, and two sonatas, for the pianoforte; a symphonic march; and a quintet for pianoforte and strings.

BURGEO (bûr'gē-ō) **ISLANDS**. A group of small islands on the southern coast of Newfoundland, in latitude 47° 33′ N., and longitude 57° 44′ W. (Map: Newfoundland, E 5). The scenery is very picturesque, and Burgeo, the chief village (population 900), is a favorite resort for artists. The islands are valuable fishing stations. Here, in 1765, Captain Cook made an observation of an eclipse of the sun.

BÜRGER, bur'gĕr, GOTTFRIED AUGUST (1747-94). A German poet. He was born in Molmerswende, the son of a country clergyman, and studied theology at Halle and law in Göttingen, where his poetic genius was fired by the works of Shakespeare and by Percy's *Reliques*. He became a leading member of the Göttingen Poets' Union (*Dichterbund*), contributed to its organ, the *Musenalmanach*, and from 1779 until his death was its editor. The University of Göttingen gave him an honorary degree in 1787, and soon after made him professor (without salary) of philosophy and æsthetics, a curious post for one of dissolute youth and discreditable manhood. The greatest work of his misguided genius was produced while he was still young. His best ballad, *Lenore* (1773), coincided in date with Goethe's *Götz von Berlichingen*, and the beginning of the decade of literary storm and stress. Goethe, who was soon to speak of him as a 'sad example,' thought his earlier poems 'worthy of a better age.' Critics to-day see in them the most potent influence toward the revival of the ballad form in which so much of the best German poetry of the next generation was cast. These ballads are classics familiar to every German schoolboy. Some of the most striking, besides the incomparable *Lenore*, are *Der wilde Jäger, Das Lied vom braven Mann, Die Weiber von Weinsberg, Der Kaiser und der Abt*, and Bürger's own favorite *Lenardo und Blandine*. Bürger also revived the sonnet form in German, and his experiments in it were praised as models by Schiller, who, however, severely criticised some of Bürger's more popular poems. His ballads have retained their pop-

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ularity to this day, and his poems have appeared in many editions. His collected works were edited by his friend Reinard (4 vols., 1796). He was introduced to English readers in *William and Helen* (1775), Walter Scott's version of *Lenore*. The elder Dumas translated *Lenore* into French. Bürger's imagination was fresh and naïve, but it was not rich nor sustained. His taste was more elegant than delicate; his style was studied, though clear and forcible. The moral tone of his poems, virile and almost uniformly noble, contrasts strangely with that of his life. His qualities were those which command popular favor, and his defects those which the majority of readers readily condone. His place in German letters is apparently secure.

BURGER, bōōr'gĕr, JOHANN (1829—). A Swiss engraver, born at Burg, in the Canton of Aargau. He was a pupil of Suter at Zofingen, and from 1850 to 1856 of Thäter at the Munich Academy, and engraved as his first plate "The Stoning of Saint Stephen," after Schraudolph. His further works include "Lady Macbeth" (1858), after Cornelius; three plates illustrating scenes from the life of Saint Bonifacius, after Hess; and "Aurora" (1887), after Guido Reni.

BURGER, LUDWIG (1825-84). A German painter and illustrator, born in Cracow. He studied at the Berlin Academy, and was a pupil of Couture in Paris. His drawings include illustrations for the works of La Fontaine and a series of plates, entitled *Die Kanone* (1866-67). He executed some fine interior decorations, in particular those for the city-hall of Berlin.

BURGERS, bōōr'gĕrs, THOMAS FRANÇOIS (1834-81). A President of the former Transvaal Republic. He was born in Cape Colony, of an old Dutch family, was educated at the University of Utrecht, Holland, and became a minister of the Dutch Reformed Church at Hanover, Cape Colony. He was an eloquent preacher, but his rationalistic views brought upon him a trial for heresy, in which, however, he was acquitted. In 1872 he was elected President of the Transvaal Republic by the Liberals, succeeding Pretorius, and continued in office until the annexation of the republic by the British in 1877. His Presidential policy was characterized by brilliant but impracticable schemes. See SOUTH AFRICAN REPUBLIC.

BURGES, bûr'jĕs, TRISTAN (1770-1853). An American politician. He was born in Rochester, Mass., and in 1796 graduated at Brown University. He became one of the leaders of the Federal Party, was Chief Justice of Rhode Island, and from 1815 to 1825 was a professor in Brown University. He then served in Congress from 1825 to 1835, where he favored a protective tariff, and attracted attention by his brilliant replies to the abuse heaped upon New England by John Randolph. Consult Bowan, *Memoirs of Tristan Burges* (Providence, 1835).

BURGESS (OF. *burgeis*, Fr. *bourgeois*, Med. Lat. *burgensis*, from *burgh*, town, borough). A citizen or freeholder in a municipality; one entitled to full rights of citizenship from his position as a householder or tradesman, and duly enrolled as such on what is known as the 'freeman's roll.' The word in time came to mean, in some places, chief magistrate of a community, and it is still used in that sense to-day in the towns of Connecticut and Pennsylvania, where the borough is a distinct political division. The first American representative legislative body was the 'House of Burgesses' of Virginia, which was called together by the Governor of the Colony in 1619. It consisted of two delegates from each of the 11 settlements embraced in his jurisdiction. The name was continued until about the time of the Revolution, as also in Maryland. The word has also been used in England to denote a member of Parliament returned from a borough, in contradistinction to a shire or county member. See BOROUGH.

BURGESS, ALEXANDER (1819-1901). An American Protestant Episcopal divine. He was born in Providence, R. I., and graduated at Brown University (1838), and at the General Theological Seminary, New York (1841). He held rectorates in Augusta, Me., from 1843 to 1854; Portland, Me., from 1854 to 1867; Brooklyn, N. Y., from 1867 to 1869; and Springfield, Mass., from 1869 to 1878. Upon the formation of the diocese of Quincy, Ill., he was consecrated as its first bishop, May 15, 1878. He also served as a deputy of the General Convention of the Episcopal Church from 1844 to 1877, representing the diocese of Maine, Long Island, and Massachusetts.

BURGESS, EDWARD (1848-91). An American yacht-designer, born in West Sandwich, Mass. He was educated at Harvard, graduating in 1871, and became secretary of the Boston Society of Natural History, in which capacity he edited the publications of the society. In 1879 he became instructor in entomology at Harvard, remaining until 1883. Financial reverses caused him to turn his attention to naval architecture, especially as to yachts. From his designs the *Puritan* was built, which proved the best American yacht, and easily defeated the *Genesta* (English) in the races for the *America's* cup in 1885. In 1886 his *Mayflower* easily led in the race with the English *Galatea*. In 1888 his fishing schooner *Carrie E. Phillips* distanced four competitors in the Fishermen's race held in Boston Harbor. His *Volunteer* won the *America's* cup against the *Thistle*, the special product of British genius, in the international races of 1887. His other yachts included the *Mariquita*, *Minerva*, and *Gossoon*, all of them remarkably swift sailing craft.

BURGESS, FRANK GELETT (1866—). An American humorous author and artist in the grotesque, born in Boston, Mass. He graduated in 1887 at the Massachusetts Institute of Technology, from 1887 to 1890 was a draughtsman on the Southern Pacific Railway, and in 1891-94 was instructor in topographical drawing at the University of California. He was a designer from 1894 to 1895, and then established in San Francisco a fantastic periodical dubbed *The Lark*, which in 1897 expired with an *Epilark*. This he followed by other ephemeral magazines. Since that time he has been a familiar contributor to English and American publications. He is the author and illustrator of such delightfully whimsical works as *The Purple Cow* (1897); *The Lark Almanac* (1898); *The Nonsense Almanac* (1898); *Goops and How to Be Them* (1900); and *A Gage of Youth* (1901).

BURGESS, FREDERICK (1853—). An American clergyman. He was born in Providence, R.

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I., and was educated at Brown University, at the General Theological Seminary, New York City, and at Oxford. After his ordination to the priesthood, he was successively in charge of Grace Church, Amherst, Mass., from 1878 to 1883; Christ Church, Pomfret, Conn., from 1883 to 1889; at Bala, from 1889 to 1896; Christ Church, Detroit, from 1896 to 1898; and Grace Church, Brooklyn. In 1902 he was made Bishop of the diocese of Long Island.

BURGESS, GEORGE (1809-66). First Protestant Episcopal Bishop of Maine. He was born in Providence, R. I., graduated at Brown University in 1826, and afterwards studied in Germany. In 1834 he became rector of Christ Church, Hartford, Conn., and in 1847 was chosen Bishop of Maine, officiating also as rector of Christ Church in Gardiner. He went to Hayti to restore his health, but died there. He published *Pages from the Ecclesiastical History of New England* (1847); *The Last Enemy Conquering and Conquered* (1850); sermons; and a metrical version of the Psalms. Consult *Memoir*, by his brother, A. Burgess (Philadelphia, 1869).

BURGESS, (JAMES (1832—). A Scottish archæologist, born in Kirkmahoe. He was educated in Glasgow and Edinburgh, went to India in 1855, and in 1873 was appointed director of the archæological survey of Western India. From 1886 to 1889 he was director-general of the archæological surveys of India. He was for some time fellow of the University of Bombay, and founded the *Indian Antiquary*. He published numerous valuable works, including *The Temples of Shatrunjaya* (1869); *The Rock Temples of Elephanta* (1871); *Scenery and Architecture in Gujarat and Rajputana* (1873); *The Cave Temples of India* (with James Fergusson, 1880); and *The Gandhara Sculptures* (1899). His writings are also to be found in the *Epigraphia Indica* (of which he was an editor) and in the *Archæological Reports* (1874-87), on the cave temples of India. He was also engaged to contribute to the volume on the *Graphic Art of India* in Bühler's *Grundriss*, or *Encyclopædia of Indo-Aryan Research* (Strassburg, 1896, et seq.).

BURGESS, JOHN WILLIAM (1844—). An American educator and writer on history and political science. He was born at Cornersville, Tenn., and studied at Cumberland University, and afterwards at Amherst College, Mass., where he graduated in 1867. He then turned his attention to law, and was admitted to the Massachusetts bar in 1869, but did not practice, and for two years was professor of English literature and political economy in Knox College. He subsequently devoted two years to study in Göttingen, Leipzig, and Berlin, and upon his return (1873) became professor of history and political science at Amherst. In 1876 he accepted a similar position in Columbia College, where he also lectured on international law. Later, his title was changed to professor of political science and constitutional law, and in 1890 he became dean of the faculty of political science. He has published a valuable treatise entitled *Political Science and Comparative Constitutional Law* (1890); *The Middle Period of United States History* (1897); *The Civil War and the Constitution* (2 vols., 1901); *Reconstruction and the Constitution* (1902).

BURGESS, NEIL (1846—). An American comedian; born in Boston. Early in his career an accident turned his attention wholly to personating female characters. An elderly actress was taken suddenly ill one evening just before the curtain rose, and Burgess hastily assumed her part. The quaint humor he put into the work produced a sensation, and he decided to make a specialty of female rôles. *Josiah Allen's Wife* was written for him, but his greatest success was doubtless in *Widow Bedott*, in which he first appeared in Providence, in 1879, and at Haverly's, New York, the year following. *Vim*, an old play of his under a new name, was produced at the Bijou Opera House, New York, in 1883, and became very popular. In 1889 he produced *The County Fair*, a play that had a successful run of more than two years in New York theatres, and has been widely repeated. He has also, in recent years, been engaged in vaudeville. Consult Clapp and Edgett, *Players of the Present*, Dunlap Soc. Pub. (New York, 1899).

BURGH, bĕrg, *Scot. pron.* bŭr'rô, or **BOROUGH** (AS. *burh*, Goth. *bourgs*, Ger. *Burg*, probably from AS. *beorgan*, Goth. *bairgan*, Ger. *bergen*, to protect). A term confined chiefly to Scotch towns and cities incorporated in a manner similar to those of English boroughs. There were originally four classes of burghs: Royal burghs, burghs of barony, burghs of regality, and free burghs. The first derived their corporate powers from a grant of the Crown; the second from that of a baron, temporal or spiritual; the third were originally burghs of barony, but by special royal grant had their powers greatly increased; the fourth, to which class all burghs of our day practically belong, originally asserted their own corporate freedom and were in general free from the great burdens of taxation, etc., common to the other forms of burghs.

BURGH, HUBERT DE. See HUBERT DE BURGH.

BURGHER, bŭrg'ĕr, and **ANTI-BURGHER.** In some burghs of Scotland the following oath was exacted of all who would become burgesses: "Here I protest before God and your lordships, that I profess, and allow with all my heart, the true religion presently professed within this realm, and authorized by the laws thereof; I shall abide thereat, and defend the same to my life's end; renouncing the Roman religion called papistry." In 1747 the Synod of the Secession Church of Scotland divided upon the construction to be put upon the words, 'The true religion presently professed.' Some held that they referred to the Established Church of Scotland, which they all considered so corrupt that they had separated from her, consequently to take the oath was tantament to pledging themselves to support what they could not in conscience support; accordingly these persons refused to take this oath. They formed the General Associate Synod, but were popularly called the Anti-burghers. The others held that the words meant no more than the Protestant religion. These formed the Associate Synod, and were popularly called the Burghers. Both bodies still further disintegrated. In 1799 the Constitutional Associate Presbytery was formed out of the Antiburghers, and its adherents were called the Old Light Antiburghers; in 1806 the Original Burgher Presbytery was made out of the Burghers, and its adherents called Old Light Burghers. Those who opposed each party were called New Lights. See PRESBYTERIAN CHURCHES.

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BŪRGI, bụr'gê, JOBST. See BYRGIUS, JUSTIUS.

BURGKMAIR, bōōrk'mēr. See BURCHMAIR.

BURGLAR-ALARM. See ALARM.

BURGLARY (from Anglo-Fr. *bourg*, OF. *borg*, borough + *laire*, Lat. *latro*, robber). A common-law offense, defined by Coke to be the breaking and entering by night into the mansion house (that is, in modern parlance, dwelling-house) of another with intent to commit a felony therein. Every essential word of this definition contains an element that is necessary to the completion of the crime. (1) There must be a *breaking*, actual or constructive. But the term 'breaking' does not necessarily imply violence; thus, the lifting of a latch, or undoing of a window-fastening, or even the compelling by threats of violence of the unlocking of a door from the inside, constitutes a breaking. It has been said that it is a burglarious breaking to come down a chimney because it is 'as much closed as the nature of things will permit,' for the essence of crime consists in violating the security of a dwelling. The breaking may even be for the purpose of exit; thus, if one enters a house by an open door with the intent to steal and it is afterwards locked and he breaks his way out, he completes thereby the crime of burglary. To enter an open door or window or climb through an aperture already made is not a breaking. One who has lawfully entered one part of a house which is divided into separate residences may be held guilty of burglary if he break into another part. (2) The *entering* need not be of the whole person; the insertion of the hand, or even of an instrument or tool, for the purpose of completing the felony is sufficient to bring the offense under the head of burglary. Thus, where a man breaks a window and inserts a cane or hook to draw out goods, the offense is common-law burglary, other conditions agreeing. The entering need not take place immediately after the breaking in order to be burglarious, but it must be connected with it as part of the criminal intent, as where a man breaks a window open on one night and, returning the night after, completes the crime. (3) The building entered must be a *dwelling-house*, or a part thereof, in actual use as a residence, and to which the person accused has no legal right of entrance. For the purpose of the definition any outhouse properly appurtenant to the dwelling and within a common inclosure or curtilage is a part thereof. This would not include, however, a distant barn or disconnected storehouse, or the like. Apartments under the same roof used for residence, and entered through separate outside doors, form separate dwelling-houses in the legal sense; so are, also, suites of rooms in a college or lodging-house where the actual owner does not reside. By English courts a church was held subject to burglary as being 'the dwelling-house of God.' (4) The breaking and entry must be *in the night time*. This is considered to include the time between the disappearance of daylight and its reappearance in the morning; daylight is further defined as existing when a man's face can be distinguished thereby; the existence or absence of moonlight has no effect in the consideration of this point, as 'the malignity of the offense does not so properly arise from its being done in the dark as at the dead of night.' (5) There must be *intent to commit a felony*. It is immaterial whether the intended felony be larceny, arson, rape, or murder; but in the last three cases, as the offense is greater than that of burglary alone, the prosecution would naturally be for the most serious crime, or its attempt. If no felonious intent exists, the breaking and entering in the night amount only to trespass.

The common-law definition of burglary has been changed by statute in many States of the United States. In some, common-law burglary and statute burglary exist side by side; in others, statute burglary is defined as of a second degree to common-law burglary. The extension of the definition of the crime in some States covers the breaking and entry in the daytime as well as the night, and of shops, factories, warehouses, etc., as well as of dwelling-houses. In a few of these States burglary has been extended to cover practically the breaking and entry of any building at any time with intent to commit any crime. The punishment for burglary under the English law extended even to penal servitude for life; in this country imprisonment for twenty years is probably the maximum punishment. The killing of a burglar, in defense of self, family, or property, is justifiable homicide (q.v.). The practice of insuring against burglary is now common, both in England and in this country. (See INSURANCE.) Consult the authorities referred to under CRIMINAL LAW.

BÜRGLEN, bụrk'len (Ger. *Bürglein*, dim. of *Burg*, fort, town). A village of Switzerland, in the Canton of Uri, 1800 feet above sea-level and about 2 miles from Altorf (Map: Switzerland, D 1). It is the reputed birthplace of William Tell. Population, in 1900, 1700.

BURGMÜLLER, bōōrk'mụl'lēr, NORBERT (1808-36). A German composer, born in Düsseldorf. He was a pupil in Cassel of Spohr and Hauptmann, and was much esteemed by Schumann, who (*Gesammelte Schriften*, III., 145) refers in high terms to his ability. His compositions, which give evidence of great imaginative and inventive power, include portions of two symphonies, of which one was finished by Schumann, an overture, and a pianoforte concerto. These, with some other music, were collected and published in Leipzig.

BUR'GOMASTER. A sailor's name for certain large gulls, as the glaucous gull of Greenland (*Larus glaucus*).

BUR'GOMASTER, or **BÜRGERMEISTER,** bụr'gẽr-mī'stẽr. The title of the chief magistrate of a city or town in Germany, analogous to the French *maire*, the English *mayor*, and the Scotch *provost*. The office is now elective, but in most parts of Germany the Government reserves the right to confirm or reject the selection of the people.

BUR'GON, JOHN WILLIAM (1813-88). An English clergyman and scholar, born in Smyrna, in Asia Minor. He studied at Worcester College, Oxford, took orders in 1848, and in 1863 was appointed vicar of the Church of Saint Mary the Virgin at Oxford. In 1876 he became dean of Chichester. From the long list of his works, the following may be cited: *Oxford Reformers* (1854); *A Plain Commentary on the Four Holy Gospels* (1855; new ed., 4 vols., 1877); *Plain Commentary on the Book of Psalms* (2 vols., 1857); *Inspiration and Interpretation* (1861);

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The Athanasian Creed (1872); and *The Revision Revised* (1883). For his life, consult Goulburn (London, 1892).

BUR'GOO (origin unknown). A name used in some parts of the United States for barbecue (q.v.). The reader is also referred to Norton's *Political Americanisms* (London, 1890).

BURGOS, bōōr'gōs (Sp., plur. of *burgo*, Ger. *Burg*, fort, castle; cf. the city's Iberian name *Briga*, hill, fort). A city of Spain and capital of the province of the same name, situated in a fertile valley at the foot of the Sierra de Oca, on the right bank of the river Arlanzón (Map: Spain, D 1). Burgos has an old quarter with narrow, crooked streets, and a quarter with fine buildings and broad promenades. The castle and walls are in ruins. The cathedral, founded in 1221, is the most elaborate Gothic structure in Spain. The city possesses numerous monuments and relics of old Spain, of the time of the Cid. The industries include woolen-cloth weaving, hat-making, etc. Burgos is the great wool mart of Old Castile, and also exports considerable grain. Population, in 1900, 31,413. Burgos was founded about the close of the Ninth Century as the capital city of the Counts of Castile and Leon, and soon became a prosperous city. When Alfonso VI. removed his residence to Toledo in 1087 the city declined in political importance and population. Consult Wilson, "Burgos Cathedral," in *The Churchman*, Vol. LXXXII. (New York, 1900).

BURGOYNE, bûr-goin', JOHN (1722-92). An English general in the American Revolutionary War, also known as a successful dramatist. He was reputed to be a natural son of Lord Bingley, but his father was Captain John Burgoyne, son of Sir John Burgoyne of Bedfordshire. He was educated at Westminster, where he made friends with Lord Strange, eldest son of the Earl of Derby, and presently eloped with his sister, Lady Charlotte Stanley, and married her in 1743. He had early entered the army, and through his marriage received promotion. In 1759, as lieutenant-colonel of the Coldstream Guards, he served at Belle-Isle. On his initiative light cavalry was introduced in the British Army the same year. He was elected member of Parliament and gave evidence of statesmanship in criticising the colonial administration. In 1762 he commanded a force sent into Portugal for the defense of that kingdom against the Spaniards, where he surprised and captured Alcántara. In 1775-76 he served in North America, and then returned to England. He landed in America again early in 1777, having been placed in command of a powerful expedition with orders to penetrate from Canada into New York State, march south along the valley of the Hudson, and join Howe's forces, so as to divide the American Confederacy in twain. Including a body of several hundred Indians, the total force at his command when he set out was not far from 10,000 men. He captured Ticonderoga on July 6, but failed to preserve his communications with Canada in the face of an ever watchful foe. On August 16 a detachment of his army was almost annihilated at Bennington by Stark. A severe engagement with General Gates at Stillwater, on September 19, resulted unfavorably for the British. Burgoyne now found himself beset. He fought a second battle at Stillwater (battle of Saratoga) on October 7, and suffered a decisive defeat. On October 17 he surrendered to Gates with between 5000 and 6000 men. The success of the Americans in this campaign was due in great measure to Schuyler. Washington allowed Burgoyne to return to England, where, denied audience of the King and refused a court-martial, he went over to the opposition party and resigned his appointments; but on a change of Ministry at the close of the American War he was appointed commander-in-chief in Ireland. He retired with his political friends two years after and devoted his time to literature. His writings include: *State of the Expedition from Canada* (1780; new ed., 1865), a vindication of his campaign; satires against Pitt's administration (in the *Westminster Guide*, 1783); and stage works, *The Maid of the Oaks*, *The Lord of the Manor* (comic opera libretto, 1780), and *The Heiress* (1786), a successful work subsequently translated into several languages. His last political appearance was as a manager of the impeachment of Warren Hastings in 1787. He died suddenly, January 3, 1792, and was buried in Westminster Abbey. Consult: Wrottesley, *Life and Correspondence of Sir John Burgoyne*, by his son-in-law (London, 2 vols., 1872); De Fonblanque, *Episodes from the Life and Correspondence of Burgoyne* (London, 1876); and Stone, *Campaign of Lieutenant-General Burgoyne* (Albany, 1877).

BURGOYNE, Sir JOHN FOX (1782-1871). An English military engineer, the son of the General Burgoyne who surrendered at Saratoga. He was educated at Eton and the Royal Military Academy at Woolwich, and entered the Royal Engineers in 1798. From 1800 to 1807 he served in the Mediterranean; was with Moore at Corunna in 1809, and served under Sir Arthur Wellesley in the Peninsula until 1814. In 1814 he was commanding engineer of the expedition to New Orleans. In the Crimean War he was chief of the engineering department of the British Army until recalled in 1855. For his services at Sebastopol he received from the Sultan the Order of the Medjidieh, and from the French Emperor that of grand officer of the Legion of Honor. He became general in 1855, was created a baronet in 1856, and in 1868 was made a field-marshal. Many of his writings were republished in *Military Opinions of General Sir J. F. Burgoyne* (1859). For his *Life and Correspondence* consult Wrottesley (London, 1873).

BURGRASS, or SANDBUR (*Cenchrus*). A genus of 10 or 12 species of grasses, distributed throughout warm temperate and tropical countries. The common burgrass (*Cenchrus tribuloides*) is an annual grass, frequent in sandy soils along river-banks. The fertile spikelet is surrounded by several sterile spikelets which develop sharp, rigid awns. Injuries from these are painful to man or animal, and frequently cause trouble with sheep, their wool becoming matted with them. It is one of the worst weeds wherever it becomes abundant. The stems are prostrate, 1 to 2 feet long, and the spikes are composed of 10 to 20 spiny burs. Wherever this pest appears every effort should be expended to eradicate it. A second species, *Cenchrus echinatus*, occurs in the Southern States, where it is known as cock-spur. It is a stouter plant than the previous species and is just as troublesome.

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BUR'GRAVE, or **BURG'GRAVE** (OHG. *burggrāvo;* cf. Ger. *Burg*, town + *Graf*, count, governor). In the Middle Ages, an imperial lieutenant in command of a castle or burg. The burgrave was an important factor in the development of towns and was given the rights of judiciary, surveillance, and police. Occasionally the jurisdiction of the burgrave extended to the country immediately surrounding the stronghold proper. As a rule the office was given to a member of the lower nobility, and soon became hereditary. With the growth of power in the cities, however, the dignity was abolished. The burgraves of Mainz, Magdeburg, and Nuremberg possessed extensive powers. In the last city the post was held by the Hohenzollern family.

BURGSCHMIET, bōōrk'shmēt, JAKOB DANIEL (1796-1858). A German statuary, born in Nuremberg. He studied sculpture under Reindel, and in 1825 was commissioned to execute from Heideloff's design a statue of Melanchthon for Nuremberg. His other works include a notable Dürer statue for Nuremberg, one of Beethoven, after Hähnel, for Bonn, of the Emperor Charles IV. for Prague, and of Luther, after Müller, for Möhra.

BURGUN'DIAN CROSS. See SAINT ANDREW'S CROSS.

BURGUNDIANS. A people descended from a tall, blond Teutonic ancestry, who moved into Gaul in the Fifth Century. The present population of the region they occupied (see BURGUNDY) has largely reverted to the Alpine type, and is said to be more French than the Auvergnats. Consult Ripley, *Races of Europe* (New York, 1899).

BUR'GUNDY (Fr. *Bourgogne*). A name applied at different periods during the Middle Ages to a number of kingdoms and principalities which arose in the region of western Switzerland, Savoy, and the valley of the Rhone. The name was derived from the Burgundians, a Germanic tribe whose original home was located between the river Oder and the Vistula, and who in the first decade of the Fifth Century invaded Gaul. After suffering defeat at the hands of the Romans, the tribe, with the consent of their conquerors, passed across the Jura Mountains (443) and established the Kingdom of Sapaudia, the modern Savoy. In 476 their dominion embraced the entire valley of the Rhone north of Provence, with their chief strongholds at Geneva, Lyons, and Vienne. They early embraced Christianity. In 534 they were subdued by the Franks. When the Frankish territories, upon the death of Clovis, were divided among his three sons, the name Burgundy was applied to one of the three kingdoms, comprising the country between the Loire, the Alps, the Vosges, and Provence. In the general dismemberment which followed upon the partition of the Frankish Empire at Verdun in 843, a new kingdom arose known as Provence, or, more frequently, Cisjurane Burgundy. It was founded by Boso of Vienne in 879, and included besides Provence the southern part of Savoy, the region between the Jura and the Saône, and Dauphiné. Rudolph, a brother of Boso, established, in 888, the Kingdom of Transjurane Burgundy, which comprehended the northwestern part of Savoy and all that portion of Switzerland lying between the Reuss and the Jura. Those two kingdoms were united in 933 and constituted the new Kingdom of Burgundy, more commonly known as Arles or the Arlate. The dynasty of Arletan kings became extinct in 1032, when the territory was annexed to the Germanic Empire by Conrad the Salic. Though the formal title was vested in the Emperor, the establishment of his authority over the country proceeded with great difficulty, and for more than 300 years Arles was the subject of continuous dispute between the French and German influence, a conflict which finally terminated in favor of the former.

When the two Burgundies had united in 933 to form the Kingdom of Arles, a small portion on the northwest, with Dijon as its chief town, remained an independent duchy, which came finally under the suzerainty of France. Up to 1361 its rulers were members of the House of Capet. In that year this ducal line became extinct and the duchy reverted to the French Crown. In 1363 it was conferred as an appanage upon Philip the Bold, the favorite son of John II. of France. Under the energetic descendants of Philip the territories of the duchy were increased, and through marriage alliances and otherwise, Flanders, Artois, Franche-Comte, Namur, Brabant, Limburg, Holland, Hainaut, Zealand, Friesland, and Luxemburg were brought under the rule of the Burgundian dukes. By the middle of the Fifteenth Century these had come to rank among the most powerful princes of Europe by reason of the extent of territory they controlled and the wealth which they derived from the flourishing cities of the Low Countries; and indeed it seemed not improbable that between the German Empire and France a middle kingdom would arise equal in power to either. Especially dangerous were the dukes of Burgundy to the French kings, their feudal lords, whose territories they threatened from the Vosges Mountains and the Rhine on the east, and from Flanders on the north. The antagonism between the dukes of Burgundy and the French kings broke out in fierce wars carried on by Charles the Bold (q.v.), who made himself the champion of feudal rights against the centralizing policy of Louis XI. Triumphing at first in his struggle with France, Charles the Bold met his fate when, carried away by his ambition, he made an attack upon the Swiss of the Jura Mountains. He was defeated in two great battles and slain in the third, the battle of Nancy (1477), and the bulk of his possessions, passing to his daughter Mary, became merged, by her marriage to the Archduke Maximilian, with the possessions of the House of Hapsburg. The Duchy of Burgundy itself, however, did not follow the fortunes of the great Burgundian realm, being immediately seized by Louis XI. as a fief of the French Crown. (See NETHERLANDS.) In 1512 the Burgundian territories were formed into one of the ten circles of the Empire.

BURGUNDY, LOUIS, Duke of (1682-1712). The grandson of Louis XIV. of France, and dauphin of France after the death of his father. He was born in Versailles. Even in childhood he was ungovernable, and in youth he became excessively violent and haughty, and abandoned to sensual pleasures. Although educated under the care of the Abbé Fénelon, he used to divert himself with drowning flies in oil and blowing up living frogs with gunpowder. He had the misfortune to be deformed; his deportment and man-

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ters were undignified, and his mind was imbued with bigotry. When only about fifteen years of age he was married to the Princess Adelaide of Savoy, and spent his time wholly in amusements in the company of his spouse, and of the ladies of the Court. In 1701 he was appointed generalissimo of the army, which was really under the command of the Duke of Vendôme, and is said to have shown some spirit in a cavalry fight at Nimwegen; but he quarreled with Vendôme, lost the respect of the army, and was exposed to many humiliations, partly proceeding from intrigues set on foot against him by his father, on whose death he became heir to the throne and was known as the Grand Dauphin. He died suddenly in the year 1712. A few days previously his wife and his son, the Duke of Bretagne, had died, and the same hearse carried father, mother, and child to Saint Denis. The Duke of Orléans, subsequently regent, and his daughter, the Duchess of Berry, were accused, but without reason, of having caused them to be poisoned. The Duke of Burgundy was the father of Louis XV. Consult Saint-Simon, *Mémoires* (Paris, 1829-30).

BURGUNDY PITCH. A resinous substance used as a basis for plasters in pharmacy, and for a variety of other purposes. It is obtained from the resinous exudation of the Abies excelsea (natural order Coniferæ), growing in southern Europe. The exuded resin is melted in hot water to remove part of the volatile oil contained in it, and strained through coarse cloth. It is quite hard and brittle, has a brown color, a sweetish taste, and an agreeable odor similar to that of turpentine. It is composed mainly of resin and a volatile oil. A substance resembling Burgundy pitch can be prepared from common resin and palm oil; this substance, however, is insoluble in glacial acetic acid, in which genuine Burgundy pitch dissolves almost entirely.

BURGUNDY WINE. See WINE.

BURHANPUR, bōōr'hän-pōōr' (*Bohra*, a Mohammedan sect + Skt. *pura*, city). A town in the Nimar District, Central Provinces, British India, once the capital of Khandesh, 210 miles east of Surat, with a population of about 32,300 (Map: India, C 4). It is on a high bank of the Tapti River, surrounded by a rampart of brick, and has in the centre a palace of brick known as the Red Fort, built by Akbar, who adorned the town with marble halls, a mosque, and gardens, now nearly in ruins. It was formerly a city of great importance, noted for manufactures of gold and silver brocade, silks, cotton, and muslin, which are still carried on, although not so extensively as formerly. Under the Moguls the city had an area of 5 square miles.

BURHEL (bûr'el), or **BHARAL** (E. Ind.). The blue wild sheep (*Ovis nahura*) of Tibet, which resembles the aoudad in many particulars, and is a transition form between the goats and sheep, "both these species having no suborbital gland and no lachrymal fossæ, while their comparatively smooth and olive-colored horns show a decided approximation to those of the goats." Other similarities exist in the skull. This species is 3 feet tall, and in winter its coarse fleece is dark ashy blue, but in summer it is much browner, with the ventral surfaces and the tail white, and the nose, throat, and front, and a line along the sides deep black. The horns of the ram are smooth, rounded, start "very close together on the forehead, describe a half-circle of 2 feet or so, and are directed very much outward and backward." Those of the ewe are only 8 inches long and simply curve backward. A sportsman, writing in *The Field*, of London, January 19, 1895, of his experience with this animal, says: "This sheep is very generally distributed over the mountains of the district which it inhabits (never below 10,000 feet), and one is constantly coming across tracks of flocks comprising from 2 or 3 to 40 or 50 individuals; but I have found it quite as hard to approach as any of the sheep—in fact, the circumstances that the old males are frequently in company with the rest of the flock all the year round, instead of separating from the females and the young rams, as is the case with most wild animals, renders it often very difficult to make a successful stalk. The ewes are excessively wary, and one or two seem always to post themselves as sentinels while the rest of the flock are grazing or lying down." Consult books mentioned under GOAT and SHEEP (Wild); and see Plate of WILD GOATS, ETC.

BURI, bōō'rē, or **BURE.** A mythical being who stands in Norse mythology as the grandfather of Odin, the supreme deity in that religion. In the Younger Edda (see EDDA), the following account is given of the creation of the world: Many ages before the earth was made, Niflheim (the nebulous or shadowy region) was formed; in the middle of Niflheim was a spring called Hvergelmir (the roaring cauldron), from which twelve rivers flowed. When the rivers had flowed far from their sources the venom which they rolled along hardened, as does the dross that runs from a furnace, and became ice. The ice stood still, and the vapor that gathered over it froze into rime, or frosty snow, and in this manner were formed the Ginnungagap (the yawning abyss, or all space), many layers of congealed vapor, piled one upon another. But the southern part of Ginnungagap was filled with sparks and flashes of fire that flew into it from Muspelheim (the home of elemental fire). In the conflict of elements the rime was melted, and the melted drops took a human semblance, and the being thus formed was named Ymir (the primordial giant). Another creature formed from this conflict of heat and cold was a cow named Audhumla (darkness), and from her teats ran four streams of milk, on which Ymir was fed. "But," asked Gylfi, "on what did the cow feed?" The answer was that she supported herself by licking the surrounding stones, which were covered with hoar-frost and salt. The first day she licked there appeared the hair of a man; the second day the head came to view; and the third day the whole man appeared. This man was called Buri or Bure. This first creature in the form of a man was the father of Bör (meaning born), who took for his wife Bestla, the daughter of the giant Bolthorn (calamity or evil), and this pair were the parents of Odin, the Norse allfather, and his brothers Veli and Ve. No wife is named for Bure, nor is anything further related of him.

BURIAL, bĕr'ĭ-*al* (AS. *byrgels*, tomb, from *byrgan*, to bury, hide in the ground, Ger. *bergen*, to hide, conceal). The method prevalent among civilized nations of disposing of the dead by hiding them in the earth. Although some peoples have had other customs—as that of the Guebres,

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who left the corpses to birds of prey, or that of the Hindus, who consigned them to the river Ganges—the general tendency of mankind has always been to bury the dead out of sight of the living. Various as the methods of accomplishing this end have been, they resolve themselves into three great classifications: (1) Inhumation, or the consigning of the body to the earth; (2) incineration, or the burning of the body and the burial of the ashes; and (3) the embalming of the body. It is natural that the first and simplest of these methods should have prevailed among savage and semi-civilized peoples, as, for example, during the states of the early and late stone ages, when the dead were simply laid away in cases in crevices. In civilized communities the methods of burial varied with country, race, and religious practices rather than with periods of civilization, and the same race sometimes altered its customs through the influence of religious change or foreign conquest.

BABYLONIA. The earliest burial practices of civilized nations seem to have originated in Babylonia. Inhumation was the rule, and cremation practically unknown. The bodies were often placed on the ground or near the surface and a mound raised over them. Sometimes they rested on a wooden board, were wrapped in a mat of reeds or palm-fibres, and were placed on the side or back or doubled up in a sitting posture. The custom then arose of placing the body in an earthen dish or jar, or in two jars fastened together by bitumen at the mouth. The dead were buried in their garments, with their staff and signet ornaments, weapons and utensils. The priests were called in to burn incense, sprinkle water, and conjure the evil spirits. There were professional mourners also, lamenting and singing dirges, who followed the bier to the grave. The cemeteries were laid out in regular streets, but the sepulchral vaults were extremely simple. No stately tombs or mausoleums have been found in Babylonia. The belief in the after life and its material existence is shown by the practice of taking to the grave food of all sorts, and water. Offerings and libations to ancestors were common. Notwithstanding the fearful floods and the primitive character of the brick vaults, the careful methods of closing the graves and of underdraining them have kept these Babylonian cemeteries in remarkable preservation.

EGYPT. The earliest Egyptians buried their dead in earthen jars like the Babylonians, but at a very early date religion decreed the preservation of the body by embalming and the construction of a tomb of considerable size. Of the four elements composing man, the body, the double or *ka*, the soul or *bi*, and the spiritual flame or *khu*, each had to be provided for in the burial arrangements. On the preservation of the body depended the continued existence of the other three elements. The 'double' lived always with the mummy, and consumed the offerings periodically brought to its reception chamber. The soul and the spirit returned after a long period from the other world to renew contact with their former envelope. Portraits of the deceased were placed in the tomb so that they could still be recognized by them, even if the mummy were injured or destroyed. The clearer conception of the after-life in its material aspect held by the Egyptians made them develop fully what is found only in germ in Babylonia. Immediately after death, the priest came with his assistants to take entire charge of the body and funeral. He closed the eyes of the deceased; handed his body over to the embalmers; saw to the preparation of the mausoleum with its paintings and images—if the deceased were well-to-do; engaged the mourners to parade the streets at stated intervals with loud lamentations, and directed the exhibition of family grief and the preparations for the procession. Meanwhile the embalming had been proceeding. First the viscera and heart were removed, stuffed with unguents, and placed in four jars; the brain, also, was set aside to dry, and the body placed to soak for seventy days in liquid litron or natron.

PHŒNICIA. The Phœnicians imagined the soul to be a restless and pitiable double, abiding either near the body of the deceased or in a gloomy under-world. The body was not fully embalmed, but was anointed and enveloped in linen bandages impregnated with substances to retard decomposition. Bodies were placed in natural grottoes or artificial chambers, or else laid in the bare earth; though they were commonly inclosed in coffins or sarcophagi, sometimes of anthropoid shape, in imitation of Egypt. Around the dead were objects of daily use and ornaments. The cippus or stele to mark the tomb developed often into a monument or chapel, especially in Hellenistic times. The early Hebrew custom is shown by Abraham's purchase of the cave of Macpela, and their occasional use of embalming in the case of the kings is proved by II. Chron. xvi. 14.

PERSIA. Among the Persians, especially the stricter following of the Magi, the ritual forbade the consigning of the body to earth, water, or fire, as these elements would thereby be polluted. The less strict Persians coated the body with a thick layer of wax and then buried it. The stricter devotees exposed it in the open to birds and beasts of prey, and the more thoroughly it was consumed by them the better the omen. The bones were then placed in an urn or a rock-cut tomb above the ground level. The soul, after dwelling near the body three days, departed on the morning of the fourth for the place of judgment. If the soul had been sinful it was accompanied over tainted plains by an evil wind and preceded by a hideous female, emblem of its evil deeds; and after being condemned in the eternal judgment hall was cast over a bridge into the abyss. The righteous soul, preceded by a beautiful maiden typifying its good deeds, passed safely, at the end of its luminous journey, into paradise.

GREECE. In the Ægean civilization the prehistoric stage is represented by some graves near Troy (Hissarlik), where the bodies were buried in simple trenches or in terra-cotta jars with utensils in stone and bone. The Mycenæan Age is best represented by the royal tombs found by Schliemann at Mycenæ. These were rectangular trenches cut in the rock to a depth of 10 to 16 feet, and closed by stone slabs. They were almost chambers, and held more than one body. The bodies, which may have been slightly embalmed before burial, wore all their most beautiful jewelry and ornaments or arms, and even had gold face-masks. A sculptured stele marked the site at the ground level, and the entire group was surrounded by a stone inclosure. These tombs and the other two Mycenæan types, those

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cut into the face of the rock and the domical tombs, are one and all family tombs, and show the universal use of inhumation, as opposed to incineration. The presence of numerous bones of many kinds of animals shows the custom of offering sacrifices to the deceased through a long period. The lavish burial with the body of the choicest costumes, ornaments, utensils, furniture, arms, and religious objects shows that the deceased was supposed to continue in the tomb itself a life analogous to his earthy one. Vaphio, Mycenæ, Palamidi, Dimini, Orchomenos, Argos (Heræum), Sparta, Menidi, Epidaurus, and the islands, such as Rhodes and Melos, have furnished every variety of such forms of burial. In the Homeric Age these primitive customs were modified, mainly by the introduction of incineration as the prevailing fashion (*Iliad*, xxiii. 164, 178; xxiv. 47-78; *Odyssey*, x. 579; xi. 27), accompanied by human sacrifices, which may have also been known in the Mycenæan Age. The burning and burying of the body forces the soul to abandon the earth for Hades. Burial was universally obligatory; its neglect by relatives a crime. The ceremony preceding burial was: The closing of the eyes and lips; the rubbing, anointing, and robing of the body; the exposure on the funeral bed in the house for a number of days, after partial embalming, with much lamentation and chanting; the burning of the body on a pyre together with the favorite animals and objects, so that they could accompany the deceased to Hades; the extinguishing of the bier with wine, gathering of the bones and ashes into urns or vases, which were buried under a mound marked by a stele; finally, a funeral repast and games.

The same material view of the future life prevailed during the succeeding historic period, although extravagances of grief and of expense and great length of exposition of the body were discouraged by law. There were four regular stages: (1) Arranging for the funeral; (2) exposition; (3) transportation; (4) burial. In preparing the body a new class of ornaments was created—rings, necklaces, diadems, brooches, amulets—too light for use and made for the express purpose of burial. It was in Asia Minor and the region of the Bosporus especially that great luxury was attained in this branch of art. In the exposition (*prothesis*) one white covering was placed over the bed, a second one around the body, and a third over all. Noisy demonstrations and the hiring of foreign singers were forbidden. The time for the transportation of the body was toward the close of night, to avoid polluting the rays of the sun; and during it no name of a god was pronounced. The funeral bed was often crowned by a canopy, and was either carried by bearers (who were always at first the parents, but later hired men), or on a chariot drawn by two horses or mules. The laws of Solon curtailed the magnificence of the procession. The common disposition of the remains during this period was inhumation in a trench, though cremation was sometimes practiced, and the ashes then commonly placed in a bronze urn. Large necropoli were now formed by the joining of family groups of tombs—always outside the city, except in Sparta. The site of the tomb was marked in several ways — by mounds, steles, edicula, or cippi. After the burial there were libations, with the breaking of vases and figurines and the burying of objects: the continuous cult of the tomb, with anniversary libations and visits, was rigorously observed. However, the absence of games and festivals, except in the case of public funerals of the greatest men, made the ceremony less conspicuous than in prehistoric times.

ITALY. The Etruscans and other early Italian races practiced inhumation at first, as is shown by primitive coffins hewn out of tree-trunks, by the persistent use of the rite of *humatio*, and by unanimous antique literary tradition. Still, the earliest necropoli yet excavated show the universal practice of incineration in the Ninth and Eighth centuries, during the 'Villanova' period. The primitive cinerary Villanova or Cabin urns containing the ashes and a few rude vases and ornaments were lowered into small cylindrical well tombs. The Seventh Century brought a change: inhumation displaced cremation, and trench tombs with long stone sarcophagi and a richer sepulchral furniture replaced the urn and well tomb. Chamber-tombs soon became the fashion, and led to the use of highly carved and painted sarcophagi of terra-cotta and marble until the Roman conquest. The numerous frescoes and sculptures in these chambers and their varied furniture give the only information available regarding Etruscan burial customs. They show clearly various stages after death: the closing of the eyes; the arraying; the exposition of the body on a couch at the entrance of the house; the official act of mourning to the accompaniment of music; the funeral procession, often of a triumphal character, with musicians, quadriga, friends, and mourners; the deposit of the body on a stone bench in the tomb or on a funeral bed or in a sarcophagus; the funeral banquet, which was so favorite an observance with the Etruscans, accompanied by music, dancing, and games, including races, wrestling, plays and shows, and even gladiatorial contests.

ROME. The Romans carried burial ceremonial to a pitch of intricacy and splendor surpassing all nations except, perhaps, the Egyptians. While they at first practiced inhumation, the practice of cremation became supreme in the Second Century B.C., lasting until it was largely superseded again by inhumation under the Antonines (Second Century A.D.). The burial rites varied according as the funeral was public or private, plebeian, patrician, or military. In important cases all citizens were invited to take part by the public crier; but ordinarily only the parents and friends. In the interval between the death and the funeral the usual ceremonies take place: closing of the eyes by the children or other relatives; the calling aloud on the defunct; the washing, anointing, and robing of the body in white, and the placing of a crown on the head, and sometimes of a coin in the mouth. Partial or complete embalming was practiced. The body remained from three to seven days on a state couch in the vestibule of the house, surrounded with flowers and burning perfumes. The funeral procession took place at night by torchlight; but under the Empire daylight funerals became the rule except for children and the poor. The body was actually carried on its litter by pallbearers—the nearest relatives—but a figure of the deceased was often drawn in a chariot. Extravagant demonstrations of grief were produced by hired mourners, and there was a band of musicians, mainly trumpeters and flute-

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players, to whom, on special occasions, singers, buffoons, and actors were added. The growing unwillingness of parents and friends to walk in the funeral procession—in imperial times—is shown by testamentary inducements to do so. The proper mourning costume was prescribed. The procession went directly to the tomb, in case of inhumation, or to the funeral pyre, in case of cremation. Arms, ornaments, favorite animals, and numerous presents were thrown into the burning pyre. The tombs where many persons were buried together by the rite of cremation were called *columbaria* (q.v.). In both rites the tombs were ordinarily on the person's private property. Elaborate ritual and memorial ceremonies followed burial.

THE EARLY CHRISTIANS. Christianity abolished cremation. The belief in the resurrection of the body made inhumation preferable. Embalming was not practiced, except occasionally, though spices and unguents were used to retard decay. Several of the Roman burial customs survived in certain regions until the Middle Ages, such as the placing of a small coin (*obolus*) in the mouth and the use of charms. The use of separate tombs was abandoned in favor of cemeteries. These were either subterranean—a class popularly called catacombs (q.v.)—or above ground (*sub dio*). The catacombs could be used only where the sub-soil contained strata of rather soft, friable rock, like tufa. They consisted of narrow galleries cut in the solid rock, in which the side walls were honeycombed with rows of narrow niches just long enough and deep enough to receive the body or bodies, the opening being then closed with a slab on which the name of the deceased was usually inscribed. The more distinguished persons were buried in chambers opening out of these passages in marble sarcophagi, often carved, or in table tombs under arched tops. With the close of the era of persecution in the Fourth Century, these subterranean cemeteries were discontinued, and as all the burial ceremonies were in the hands of the clergy, it became natural to attach the cemeteries, wherever possible, to the churches, especially to suburban churches. Often there were built parallel brick walls with rows of shelves for the bodies. There were no sepulchral chambers, but the bodies were laid in regular rows of trenches, sometimes merely excavated, sometimes constructed of brick or stone work, while at other times the trenches contained plain sarcophagi of different materials. This custom has continued with but one important variation, the introduction during the Middle Ages of the custom of burying within the church itself, and in the cloisters attached to it. This led to the use of magnificent sepulchral monuments, which became an important part of church ornament. Each monastery also buried its members in a cemetery attached to its church. Often the space under the pavement of churches was honeycombed with tombs, frequently marked by sepulchral slabs. Certain churches, such as Westminster Abbey and Saint Denis, became national funerary Halls of Fame. There were also, from an early date, special sepulchral chapels and oratories for saints, martyrs, and other personages.

The northern nations, such as the Goths, preserved after their conversion some of their old funeral customs, such as the burial of arms, jewelry, and other objects of value in great numbers with the deceased. As a rule, however, the ancient custom of burying articles of value in the tomb gradually ceased during the poverty of the early Middle Ages, and was never revived. The ceremonial connected with Christian burial is a regular part of the liturgy of the different branches and denominations, and took definite form at an early date. (See LITURGY.) While at first the dead were buried at the cost of the Church, after the Fourth Century this was done only for the poor. The eyes and mouth were closed by the nearest relative, the body washed and anointed—a custom which became obsolete after the Tenth Century. The ointments used were for partial preservation of the body. The body was then closely swathed in white linen and bound. Very soon the custom was introduced, especially in the case of the clergy and the nobility, of burying in the richest vestments, and the finest examples of early stuffs have been found in tombs. After the exposure of the body in the house—usually in an upper or inner chamber—the bishop, with his clergy, visited the house, recited prayers, and sprinkled it with holy water; and the ceremony included a eulogium of the deceased, which was often pronounced in the church. Most of these early customs have survived.

For further information as to burial rites, see the paragraph on ceremonies, under the title MAN. See also CEMETERY LAWS; CORPSE.

BIBLIOGRAPHY. Maspero, *The Dawn of Civilization* (Eng. trans., New York, 1894); Wilkinson, *Manners and Customs of the Ancient Egyptians*, Vol. III. (New York, 1879); Guhl and Koner, *Life of the Greeks and Romans* (Eng. trans., New York, 1876); Wagner, "Death and Burial," in *Manners, Customs, and Observances* (London, 1895); Hasenclever, *Der altchristliche Gräberschmuck* (Brunswick, 1886); Vucasovic, "Funeral Customs and Rites Among the Southern Slavs in Ancient and Modern Times," in *Archives of the International Folk-Lore Association* (Chicago, 1898); Preuss, *Die Begräbnissarten der Amerikaner und Nordasiaten* (Königsberg, 1894); Yarrow, "Mortuary Customs of North American Indians," *First Smithsonian Report, Bureau of Ethnology* (Washington, 1881); Walker, *Gatherings from Graveyards, Particularly Those of London* (London, 1839); Wickes, *Sculpture: Its Methods and Requisites* (Philadelphia, 1884); Brand, *Popular Antiquities* (London, 1877).

BURIATS, bōō'rē-ăts' (in Russ. *buryaty*, from their ancestor *Bargubator*, or, according to another legend, *Buryaday*). A Mongol people numbering some 250,000, inhabiting the region about Lake Baikal (particularly the Irkutsk country), in southern Siberia. In their less marked Mongolian physical characteristics, their tendency to become farmers, and the preservation by a considerable portion of the primitive Shamanism of the original stock, the Buriats differ from their kindred, the eastern and western Mongols. In some branches of industry (metal-work, etc.) they show much skill, and certain members have even acquired some scientific education. Before Russian contact the Buriats were subject more or less to Chinese influence and intermixture with other Siberian peoples. The best account of these people is that of Dr. N. Melnikoff in the *Internationales Archiv für Ethnographie* for 1899, where the good and bad

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effects of Russian influence and the present condition of the Buriats are discussed at length. The Buriats are increasing in numbers, and assimilation with the Russian population of Siberia, not extinction, seems to be their destiny. See MONGOLS.

BURIDAN, bu'rē'dăn', JEAN (c.1300-c.58). A French scholastic metaphysician of the nominalistic party. He was born at Béthune, in Artois, studied in Paris under Occam, and was rector of the university there in 1327. Little is known of his life. It is related, but also disputed, that Buridan was driven from France, fled to Austria, and there gave the impetus to the founding of the University of Vienna. He took no part in theological discussions. His name is popularly connected with the *pons asinorum* (in logic, not in geometry) and with the ass between two haystacks. The former was a name given to any laboriously obtained syllogistic middle term, which acts as a bridge to connect major and minor terms. (See LOGIC.) Such a term was called 'an ass's bridge,' because, according to Aristotle, in a clear reasoner's thought this middle term is spontaneously suggested. The other ass, carefully placed between two equally allurring bundles of hay (called 'Buridan's ass'), established the doctrine of *Determinism* (q.v.). Neither the ass nor his bridge appears in Buridan's extant writings, and they are probably the inventions, the former of a hostile caricaturist, the latter of some friendly wit. His chief works are *Summa de Dialectica* (1487); *Compendium Logicæ* (1489); *In Aristotelis Metaphysica* (1518); and *Quæstiones in Decem Libros Ethicorum Aristotelis* (1489). Consult Prantl, *Geschichte der Logik*, Vol. IV. (Leipzig, 1855-70). See NOMINALISM.

BU'RIN. A port of entry, capital of a district of the same name, Newfoundland, on Placentia Bay, 190 miles south of Saint John's (Map: Newfoundland, E 5). It has a well-protected harbor, important fisheries, and carries on a considerable trade with Saint Pierre. Population, 3000.

BU'RIN (Fr., probably from OHG. *bora*, Engl. *bore*, gimlet), or GRAVER. The principal instrument used in copper-engraving. It is made of tempered steel, and is of prismatic form, the graving end being ground off obliquely to a sharp point. The style of a master is frequently described by the expressions *soft burin*, *graphic burin*, *brilliant burin*, or whatever other character may belong to it. See ENGRAVING.

BURITI (bū'rĭ-tē') **PALM** (Portug., from native Brazilian). A beautiful palm which grows in great abundance in the swamps of some parts of the north of Brazil. It is *Mauritia vinifera*, one of several species of the genus Mauritia, and is one of the loftiest of palms. Its leaves are fan-shaped, and form a large globular head at the top of the stem. It produces a great number of nuts about the size of a small hen's egg, covered with rhomboidal scales arranged in a spiral manner. Between these scales and the albuminous substances of the nut there is an oily, reddish pulp, which is boiled with sugar and made into a sweetmeat. An emulsion is also prepared from it, which, when sweetened with sugar, is a very palatable beverage. The juice of the stem also makes a very agreeable drink. To obtain it, the tree is usually cut down, when several holes about 6 inches square, 3 inches deep, and 6 feet apart, are cut in the trunk with a small axe; and these in a short time are filled with a reddish-colored liquid, having much the flavor of sweet wine. There are six or seven species of Mauritia, all of them American.

BURKE, EDMUND (1729-97). An English statesman and orator. He was born in Dublin, where his father had an extensive practice as an attorney. As a schoolboy he displayed those traits of character and the germs of those powers which ultimately gave him greatness. His preparatory training was gained at a school in Ballitore, County Kildare, kept by Abraham Shackleton, a member of the Society of Friends. To this man, whom he always held in affectionate esteem, he believed he owed the best part of his education. In 1743 Burke entered Trinity College, Dublin, where he seems mainly to have devoted himself to his favorite studies of poetry, oratory, history, and metaphysics. He made himself acquainted with Latin writers, particularly with Cicero, whom he accepted as a model 'in eloquence, in policy, in ethics, and philosophy.' In February, 1748, he graduated B.A., and in 1751 took his degree as master of arts. In the interval (1750), being destined for the English bar, he proceeded to London, to keep his terms at the Middle Temple, where he had been entered in 1748. To legal studies, however, he never took kindly, and ultimately he abandoned the idea of becoming a barrister. During the years 1750-56 he would appear to have occupied himself mainly in traveling through England and on the Continent, enjoying the society of literary men.

When yet at the university Burke had achieved a local reputation for literary talent and eloquence. Among the compositions of his undergraduate life the most noticeable perhaps is his translation of the conclusion of the Second Georgic of Vergil, which shows poetic talent of no mean order. His first important publication, however, was the celebrated *Vindication of Natural Society*, written in imitation and ridicule of the style and reasoning of Lord Bolingbroke, in which, with well-concealed irony, he endeavored to confute his lordship's views of society by a *reductio ad absurdum*. This work, published anonymously in 1756, attracted considerable attention. Soon after, in the same year, appeared his well-known essay, *The Philosophical Inquiry Into the Origin of Our Ideas on the Sublime and Beautiful*—a work which gained the praise of Johnson and Lessing.

The essay on the Sublime and Beautiful, although of little real value, attained a rapid popularity, and its author soon found himself courted by all the eminent men of his time. Garrick was already one of his friends; among them he soon could count Reynolds, Soame Jenyns, Lord Lyttelton, Goldsmith, Hume, and Dr. Johnson. Notwithstanding this popularity, his progress continued slow; for three years he had to occupy himself with periodical writing, devoting his leisure principally to political subjects. What is considered a joint work of Burke and his cousin, William Bourke, appeared in 1757—*An Account of the European Settlements in America*—and shows how carefully at this date he had studied the condition of the Colonies. During the next year he began his writing for the *Annual Register*, the first volume of which appeared in 1759. In 1761 Mr. W. G. Hamilton ('Single-speech'

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Hamilton), then Secretary for Ireland, having appointed him his private secretary, he returned to Dublin, where, during two years' service, he demonstrated his aptitude for political business, receiving in 1763, in reward for his services, a pension on the Irish establishment of £300, which, however, he did not long enjoy.

Returning to London in 1764, he became a member of the literary club which met at the Turk's Head in Gerard Street, and whose history is associated with almost every considerable name in the literature of the period. But literary society did not call off his attention from the chances of a political career. He became private secretary to the Marquis of Rockingham, on his becoming Premier (1765), and entered Parliament as a member for Wendover (1766). Here his eloquence at once gave him the reputation of being 'the first man in the Commons.' The Rockingham Administration, however, lived only a few months, and with it terminated this, his second political employment. He was successively member for Wendover, Bristol, and Malton; his Parliamentary life extended without intermission to 1794. Twice he held the post of paymaster of the forces, once under Rockingham, and again under Lord North, with the standing of a privy councilor. After a career in Parliament remarkable for the laboriousness, earnestness, and brilliancy with which every duty was discharged, and extending over nearly thirty years, he retired at last, receiving the thanks of the Commons for his numerous public services, and rewarded by the Government, on the express request of his sovereign, with pensions amounting in all to several thousand pounds. He administered the office of paymaster of the forces with scrupulous regard to public economy, and sacrificed all the perquisites of his office, exhibiting a severe integrity then unusual among public men. In his relations with the constituency of Bristol, which was alienated from him by his advocacy of the claims of the Roman Catholics and of the opening up of the trade of Ireland, he was the first to maintain the doctrine of the independence of Parliamentary representatives—that they are not machines to vote for measures approved by their constituencies simply for that reason, but men and thinkers chosen by them calmly to consider and legislate for the good of the Commonwealth. During his career he rendered more important service to the cause of humanity than any other man of his time in Europe: he prepared the way for the abolition of the slave-trade, a measure which was destined to ripen to success in the hands of Wilberforce; he advocated the cause of humanity in India against the voracious greed of stockholders, who regarded its millions simply as materials for plunder, and largely contributed to improve the government of that country. Toward America he advocated a policy of justice and conciliation, which had it been adopted would have averted the horrors of the War of Independence, and retained the Colonies in amity with the mother country. To the advocacy of every cause which he espoused he brought a capacity for patient research that was unlimited, and an eloquence that has seldom been equalled.

Burke produced a vast number of writings on many subjects. Among the more important are: *Observations on a Pamphlet on the Present State of the Nation* (1769), replying to a paper variously ascribed to Fox or Grenville; *On the Cause of the Present Discontents* (1770); the celebrated speech in 1788 opening the trial of Warren Hastings (q.v), and the equally famous speeches on *American Taxation* (1774) and on *Conciliation with America* (1775), which may perhaps be regarded as the most splendid monuments of his eloquence and statesmanship. On the other hand, with strange inconsistency, Burke resisted the movement for the reform of Parliamentary representation; and he failed utterly to grasp the true meaning of the French Revolution. In 1790 appeared his *Reflections on the Revolution in France*, which had a remarkable success. Eleven editions were issued within the first year, and by 1797 more than 30,000 copies had been sold. It was received with delight by George III., and by every enemy of the Revolution; yet, as a contribution to the literature of social history, the book is worthless. Burke was an ardent lover of order; and, deceived by the violence of the Jacobins, the man who had stood so bravely for the rights of the English colonists and the Hindus was unable to perceive that the French people were struggling to free themselves from a class despotism far more oppressive. In his *Rights of Man*, Thomas Paine made a trenchant reply to Burke's book; and it was also answered by Mackintosh in *Vindiciæ Gallicæ*.

Few men have been the subjects of higher panegyric than Burke, and, on the whole, few have better deserved praise. He was noble-minded, pure in his life, and a purist in politics. Intellectually, he was most richly endowed. Possessing imagination, rare powers of observation, and indefatigable industry, there was no subject which he could not master, and none which, having mastered, he could not expound with unparalleled richness of language. But with these virtues and powers were conjoined defects, which, without bating their greatness, largely neutralized their influence. He was, it may be said, too literary to be a philosopher, and too philosophic to be a politician. His career would seem to illustrate this position. His oratory astounded by its brilliancy rather than persuaded by its tone and argument; and in the long run the eloquence which failed to command the reason ceased to captivate the ear. The man who at first evoked the enthusiasm of the House by the brilliancy and power of his eloquence, did actually at last empty it by persistence in the monotonous splendors of his speeches. Passionate and in a great degree intractable, he was unsuited for party politics, and drifted from all his connections, breaking up slowly all party ties, and even the ties of friendship, till he reached at last almost a state of political isolation. At the same time, it must not be forgotten how great an influence he, half philosopher, half politician, exercised on the counsels of the State; many of his views on politics and public economy were anticipations of science, as many of his previsions of the course of events were prophecies. He died on July 8, 1797.

There is an excellent edition of Burke's *Works* in 12 volumes (Boston, 1871); reprinted in 6 volumes in the Bohn series (London, 1880). His *Letters*, in 4 volumes, were edited by Earl Fitzwilliam and Sir R. Bourke (London, 1844): and they are reprinted in the edition of the *Works* (London, 1852). Consult: A. J. George, editor, *Speeches on the American War*, and *Letter to the Sheriffs of Bristol* (Boston, 1891); James

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Prior, *Life* (5th ed., London, 1854); Croly, *Memoir of the Political Life of Burke* (Edinburgh, 1840); Macknight, *History of the Life and Time of Burke* (3 vols., London, 1858); Morley, "Burke," in the *Men of Letters Series* (New York, 1879), and *Historical Study* (New York, 1867); and Hunt, in *Dictionary of National Biography*, VII. (New York, 1891).

BURKE, JOHN (1787-1848). An Irish genealogist. He began literary work in London, but later made a study of genealogy, and in 1826 began the publication of the *Genealogical and Heraldic Dictionary of the Peerages of England, Ireland of the United Kingdom* (9th ed., 1847), the first compilation of the sort to include both baronets and peers in alphabetical order. Chief among his other publications are: *A General and Heraldic Dictionary of the Peerages of England, Ireland, and Scotland—Extinct, Dormant, and in Abeyance* (1831; 3d ed., 1846); and *A Genealogical and Heraldic History of the Commoners of Great Britain and Ireland* (4 vols., 1833-38), later editions of which appeared under the title, *A Dictionary of the Landed Gentry* (1855-57).

BURKE, Sir JOHN BERNARD (1814-92). An Irish genealogist, son of the preceding. He was born in London, was educated at Caen College (Normandy), studied law at the Middle Temple, was admitted to the bar in 1839, and in 1853 became Ulster king-at-arms. In 1855 he was appointed keeper of the State papers in Ireland. In this capacity, in 1866, he visited France for the purpose of studying the record system in use there. From 1847 until his death he edited the annual *Genealogical and Heraldic Dictionary of the Peerage and Baronetage of the United Kingdom*. At various times he was also editor of other works of a similar character. Among his original publications are *The Romance of the Aristocracy* (1855) and *The Book of Precedence* (1881).

BURKE, MAURICE FRANCIS (1845—). An American prelate, born in Ireland. He was educated at Saint Mary's University, Chicago, Ill., and the American College, Rome, Italy, and was ordained priest of the Roman Catholic Church in 1875. Pastor of Saint Mary's Church, Joliet, Ill., from 1878 to 1887, he was in the latter year consecrated Bishop of Cheyenne, Wyo. In 1893 he was transferred to the see of Saint Joseph, Mo. He is an accomplished linguist.

BURKE, ROBERT O'HARA (1820-61). An Irish explorer, born at Saint Cleram (County Galway). He was educated in Belgium, and afterwards enlisted in the Austrian Army, in which he rose to be captain. In 1848 he became a member of the Irish constabulary. In 1853 he emigrated to Australia, where he was appointed inspector of police in Victoria. He received in 1860 the command of an expedition sent out to cross the continent from south to north. With W. J. Wills he reached the tidal waters of the Flinders River, being thus one of the first white party to traverse Australia. On the return journey both he and Wills died of starvation near Cooper's Creek. Their bodies, recovered in 1862, were given a public burial early in 1863, and memorial statues were erected in Melbourne. Consult Howitt, *History of Discovery in Australia*, Vol. II. (London, 1865).

BURKE, THOMAS MARTIN ALOYSIUS (1840—). A Roman Catholic prelate. He was born in Ireland, January 10, 1840; educated at the College of Saint Michael, Toronto, and at Saint Charles College, Maryland; graduated from Saint Mary's Seminary, Baltimore, was ordained to the Roman Catholic priesthood and assigned to duty at Albany, N. Y., 1864; became Vicar-General of the diocese in 1887; and was consecrated the fourth Bishop of Albany in 1894.

BURKE, THOMAS NICHOLAS (1830-83). A Roman Catholic orator known as 'Father Tom.' He was born in Galway, Ireland; studied theology in Rome and Perugia; joined the Order of Saint Dominic, and after remaining five years in Italy was sent by his superiors to England. He soon established a reputation as an orator; preached in Ireland, England, and Italy; and in 1872 visited the United States, where his course of lectures in answer to Froude gained much attention. His lectures were reprinted under the title of *English Misrule in Ireland* (1873). Consult: his *Life* by W. J. FitzPatrick (London, 1885) and *The Inner Life of Father Thomas Burke* (London, 1894).

BÜRKEL, bür'kel, HEINRICH (1802-69). A German painter, born at Pirmasens, Bavaria. He studied at the Munich Academy and in Italy, and painted chiefly genre pictures in a style which is truthful and sometimes humorous. His pictures include "Scenes in an Inn;" "Fêtes in the Alps;" and "Winter Scene in the Tyrol."

BURK'ING. A colloquial term in England for murder committed for the purpose of selling the victim's body for dissection. It came into use after the conviction, for an atrocious crime of this character, of William Burke, executed in Edinburgh, January 28, 1829.

BURKLEIN, bōōrk'lin, FRIEDRICH (1813-72). A German architect, born at Burk, in Franconia. He studied at the Munich Academy as a pupil of Gärtner—whom he assisted in the construction of the royal palace in Athens—and was active in the architectural development of Munich under King Maximilian II. He designed the Maximilianstrasse, and built the Maximilianeum. As *Generalbaudirektor*, he had charge of many public works. His style combined the Renaissance and the Romanesque types.

BURLEIGH, bĕr'li, LORD. See CECIL, WILLIAM.

BURLEIGH, LORD. A character in the parody on heroic tragedy which Sheridan introduces into *The Critic*. According to Mr. Puff, his creator, he can express volumes with his nod alone.

BURLESQUE. A dramatic or literary composition tending to excite laughter by an exaggerated travesty of some more serious work, or by a ludicrous contrast between the subject and the manner of treating it. A burlesque is distinct from a parody or satire, being of a broader, more pronounced type, and differs from a farce in being even more extravagant in its construction.

The burlesque in literature was first used as a distinct style by Berni, an Italian poet, who, early in the Fourteenth Century, published a volume of *Burlesque Rhymes*. The success of this book brought forth a host of imitators, among whom were Mauro and Caporali, and introduced the burlesque into France, where Sarrazin, and, later, Scarron, carried the new form to a high degree of excellence. *L'Enéide travestie* was the

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beginning of a long line of travesties in which Scarron burlesqued Paris, Amsterdam, society, etc., and by which he established firmly his reputation as the greatest French writer of burlesque. In England burlesque developed early, along a somewhat irregular line. Chaucer, for instance, in his *Rime of Sir Thopas*, ridicules the long, dreary tales of the Middle Ages; Beaumont and Fletcher's *Knight of the Burning Pestle* is a travesty on ultra-chivalric romances; Butler's *Hudibras* contains burlesque motives; and still later *The Rejected Addresses* of the Brothers Smith brought the English form of burlesque to a high level. In Spain Cervantes, with his immortal *Don Quixote*, created a new type of burlesque, which was imitated in the next century by Le Sage in France with his diverting history of *Gil Blas*. During the later history of literature there have been innumerable travesties, parodies, and burlesques of contemporary poems and authors, but, with the possible exception of those by Thomas Hood, none of them are of importance.

The dramatic burlesque has varied greatly in its form. Aristophanes uses it in his comedies; Euripides and Plautus contain germs of it; the Italian dramatist Gozzi employs it most successfully in his tragi-comedies; and under Molière burlesque *per se* reaches its highest dramatic excellence. The most noted of English burlesques on the stage are those of Planché, brought out in London in the years following 1818; and a rich vein of travesty runs through many of the plays of W. S. Gilbert (q.v.). But in modern times burlesque has degenerated from comedy to farce, and from farce to a musical medley of travesty and vaudeville. Indeed, in France the 'vaudeville' corresponds to the English burlesque. Consult: Flögel, *Geschichte des Burlesken* (Leipzig, 1793); Morillot, *Scarron et le genre burlesque* (1888); *Burlesque Plays and Poems*, in Morley's *Universal Library*.

BURLINGAME, Anson (1820-70). An American politician and diplomatist. He was born at New Berlin, N. Y., but removed with his father to Ohio in 1823 and to Michigan ten years later. He graduated at the University of Michigan in 1841, and at the Harvard Law School in 1846, and subsequently practiced law in Boston. In 1852 he became a member of the State Senate, and in the following year was sent to the State Constitutional Convention. He was an enthusiastic worker in the Free-Soil Party, especially in the Presidential campaign of 1848; and in 1854 joined the American Party, and became one of its representatives in the Thirty-fourth Congress. His denunciation of Brooks's assault upon Senator Sumner provoked a challenge from Brooks, which he at once accepted, naming rifles as the weapons. Brooks did not fight. Burlingame was a Congressman until 1861, and in that year was sent as Minister to Austria, where the feeling against him, because he had favored Hungarian independence, led to a positive refusal to receive him as a diplomatic representative. He was then sent to China, where he remained as Minister until 1867, when, having completely gained the confidence of the Chinese Government, he was appointed special Chinese envoy to the United States and various European Powers. In 1868 he negotiated with the United States Government the "Burlingame Treaty," notable as marking the first acceptance by China of the principles of international law, and as granting important reciprocal privileges to the two Powers. Subsequently he negotiated important treaties with Denmark, Sweden, Holland, and Prussia, and in 1870 he died in Saint Petersburg while arranging the terms of a treaty with Russia.

BURLINGAME, Edward Livermore (1848—). An American magazine editor, born in Boston, Mass. He was educated at Harvard and Heidelberg, and became editorially connected with the *New York Tribune* in 1871. From 1872 to 1876 he was a member of the staff for the revision of Dana and Ripley's *American Cyclopædia*, and in 1879 joined the editorial force of Charles Scribner's Sons. In 1886 he became editor-in-chief of *Scribner's Magazine*.

BURLINGTON. See Bridlington.

BURLINGTON. A city, railroad centre, and county-seat of Des Moines County, Iowa, 266 miles west-southwest of Chicago, Ill., on the right bank of the Mississippi River, and on the Chicago, Burlington and Quincy and several other railroads (Map: Iowa, F 4). Burlington, sometimes called the 'Orchard City,' occupies a natural amphitheatre, formed by the limestone bluffs that slope back from the river, and on which many of the residences are built, and is regularly laid out. The river here is broad and deep, and is spanned by the railroad bridge of the Chicago, Burlington and Quincy Railroad. Burlington is connected by steamboat lines with important points on the Mississippi, and its river commerce is important. The industries are the manufacture of machinery, wagons, wheels, desks, furniture, lumber, agricultural implements, screens, mattresses, brooms, soap, flour, linseed oil, etc.; pork-packing and the quarrying of limestone found in the vicinity. The extensive machine and repair shops of the Chicago, Burlington and Quincy Railroad are located here. Among the prominent buildings are the opera house, Young Men's Christian Association building, court-house, city hall, and hospitals. The city has a public library of over 17,000 volumes, Burlington Institute College, besides high schools and grammar schools. Crapo Park, of 100 acres, situated in the southern part of the city, has a fine location and scenery not excelled along the Mississippi. The city is governed by a mayor, elected for two years, and a city council, which has the power of appointment to most of the city's offices. Burlington was named from the city of Burlington, Vt., by its first settlers. A fur-trading post was established here as early as 1829; the first dwelling-houses were erected in 1833, a town was laid out in 1834 and incorporated in 1837, and the city chartered in 1838. It was the capital of Iowa from 1837 to 1840. Population, in 1890, 23,201.

BURLINGTON. A city and county-seat of Coffey County, Kan., 60 miles south of Topeka, on the Neosho River, and on the Atchison, Topeka and Santa Fé, and the Missouri, Kansas and Texas railroads (Map: Kansas, G 3). It is the centre of an agricultural and stock-raising district, in the principal products of which it has considerable trade, is supplied with good water-power, and contains flour-mills. The city has a public library. Population, in 1890, 2239; in 1900, 2418.

BURLINGTON. A city and port of entry in Burlington County, N. J., on the Delaware

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River, 18 miles above Philadelphia, and on the Pennsylvania Railroad (Map: New Jersey, C 3). Burlington has a public library, and is the seat of Burlington College, founded in 1846, and Saint Mary's Hall for girls (Protestant Episcopal). There are manufactures of shoes, stoves, iron pipe, carriages and harness, and canned goods. Burlington is governed under a charter of 1851 (revised 1868), which provides for a mayor, elected every three years, and a municipal council. The city owns and operates its water-works. Population, in 1890, 7264; in 1900, 7392.

Burlington was settled in 1677 by London and Yorkshire Friends, and before receiving its present name, was called first New Beverly, and then Bridlington. After 1686, until Trenton was made the capital of New Jersey, the Legislature met alternately at Perth Amboy and Burlington. A city charter, granted by Governor Cosby in 1733, was confirmed by the Legislature in 1744, and in 1784 a new charter was issued. The city was fired upon by the English and Hessians in 1776, and again in 1778, when much property was destroyed, though no lives were lost. Consult Woodward, *History of Burlington and Mercer Counties* (Philadelphia, 1883).

BURLINGTON. A city, port of entry, and county-seat of Chittenden County, Vt., 40 miles west by north of Montpelier, on the eastern shore of Lake Champlain, and on the Rutland and Central Vermont railroads (Map: Vermont, A 4). Burlington has a beautiful situation on high ground, and is laid out in broad, well-shaded streets. In the centre of the city is a large public square, near which are the handsome court-house, the city hall, the United States post-office and custom-house, and the Young Men's Christian Association building and the site of the new public library. The University of Vermont and State Agricultural College (q.v.), founded in 1791, is finely located on a hill; the Billings Library, designed by H. H. Richardson, is the most notable of its buildings. Among other features of the city are the Fletcher Free Library, the Howard Opera House, the Masonic Temple, the Roman Catholic cathedral, Saint Paul's Episcopal Church, the Mary Fletcher Hospital, Home for Destitute Children, Louisa Howard Mission, Providence Asylum, Saint Patrick's Academy, Saint Mary's Academy, Bishop Hopkins Hall, Edmunds High School, Vermont Episcopal Institute, Battery and College parks, the latter containing a statue of Lafayette, and two cemeteries—Lake View, situated near the lake, and Green Mount, overlooking the Winooski Valley, and containing the grave of Col. Ethan Allen, with a monument. An artificial breakwater forms a safe harbor, connected by steam and sailing vessels with leading ports on the lake. Burlington is one of the largest lumber markets in the country, the product being brought principally from Canada; and extensive quarries of marble, limestone, and other building-stone in the vicinity furnish material for another branch of its commerce. There are also important manufactures, to some extent promoted by the water-power furnished by the Winooski River, which include lumber, furniture, chairs, refrigerators, packing-boxes, brushes, patent medicines, cotton and woolen goods, paper, etc. Under a revised charter of 1896, the government is vested in a mayor, annually elected; a city council, of which the executive is a member; and administrative officials, the majority elected by the council. The water-works are owned and operated by the municipality. Population, in 1880, 11,365; in 1890, 14,590; in 1900, 18,640.

Burlington was chartered in 1763, but no settlement was made until about 1774, and it was not regularly organized as a town until 1797. In 1809 the *Vermont*, one of the first steamboats to be built in the country, was launched here. Burlington was chartered as a city in 1865.

See Vol. I. of *Vermont Historical Gazetteer* (4 vols., Burlington, 1867-82), and a sketch in the *New England Magazine* (Vol. XI. second series).

BURLINGTON ARCADE, The. A paved and roofed passage, raised a few steps above the street, running between Piccadilly and Burlington Gardens, London. On each side are small, open-fronted shops, where minor wares of all sorts can be purchased.

BURLINGTON HOUSE. An old mansion in Piccadilly, London, between Old Bond and Sackville streets, built for Richard, Lord Burlington, in 1695-1743. It was a meeting-place of Eighteenth-Century notables, and is still a literary and scientific centre. It was purchased by the British Government in 1854. On part of the old garden stands the new Burlington House, finished in 1872, the home of the Royal, Geological, and Antiquarian Societies, and other learned bodies.

BURLINGTON LIMESTONE. A limestone of Carboniferous age, and a valuable material for building, found in abundance near Burlington, Iowa, and elsewhere in the Mississippi Valley. It is divisible into two members, the upper one being nearly pure carbonate of lime, the lower one containing magnesia. This formation is peculiar for the abundance of fossils found in it, especially of crinoidea and corals.

BURLOS, bōōr'lōs (from the cape *Brullus*). A lagoon in the Nile delta, Egypt, beginning about 5 miles east of Rosetta. It extends eastward for about 38 miles, and is separated by a narrow strip of land from the Mediterranean, with which it communicates through a narrow channel (Map: Egypt, D 1).

BUR'MA (corrupted from *Mrumurā*, *Myomma*, *Barma*, *Bamu*, probably connected with the introduction of Brahmanism). The largest and easternmost province of British India. It is included within the parallels of 10° and 28° N., and the meridians 92° and 101° E., and extends from the southern border of Tibet far down into the Malay peninsula, with a total length of 1250 miles. The eastern boundary of Burma follows a meridian approximately throughout the whole extent from north to south. The east and west extent, however, varies extremely, the country beginning at the south as a strip of territory 30 or 40 miles wide, and broadening toward the west, at about latitude 16° or 17° N., to a width of 200 miles. Above latitude 20° it again broadens slightly toward both east and west, reaching its greatest width of about 550 miles in latitude 21° N. North of

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latitude 24° the breadth rapidly decreases to about 125 miles on the northern border. Burma has an area, exclusive of dependent native States, of 168,550 square miles, and is divided for administrative purposes into Upper and Lower Burma. Lower Burma occupies the narrow strip of coast south of about latitude 22°, and Upper Burma occupies the remainder of the country extending inland as far south as latitude 18° 30′. Lower Burma comprises the former Kingdom of Arakan (q.v.) in the north and Tenasserim (q.v.) in the south (both acquired by the British at the close of the first Burmese War in 1826), and between these two the territory of the old Kingdom of Pegu (q.v.), acquired by the British at the close of the second Burmese War in 1852. Upper Burma corresponds to the Kingdom of Burma as it existed at the time of the British conquest in 1885. Burma is bounded on the north by Assam and Tibet; on the east by China, French Indo-China, and Siam; on the south by the Bay of Bengal; and on the west by the Bay of Bengal, Bengal, and Assam. It extends from the lower waters of the Bay of Bengal on the south to the eastern end of the Himalayan Mountains on the north. It is traversed by a series of mountain ranges lying nearly north and south, while in the intervening valleys flow the waters of the two great rivers, the Irrawaddy and the Salwin, with many large branches, and also several smaller rivers reaching the coast. Thus the surface consists of many mountain ranges alternating closely with valleys, most of which are narrow, the valley of the Irrawaddy being by far the broadest and most important economically.

The mountains on the northern boundary, separating Burma from Tibet, reach a height of 15,000 feet. The ranges which traverse the country in general diminish in height southward, ranging from 8000 to 10,000 feet in the north to 6000 to 8000 feet in the latitude of Mandalay, and to 4000 to 6000 feet between the parallels of 18° and 20°. The Irrawaddy and Salwin rivers rise in Tibet and are large streams at their entrance into Burma. The upper part of the valley of the Irrawaddy is narrow, as are the valleys of its upper tributaries. Indeed, above Bhamo, at the mouth of the Taping, the main river flows in a mountain gorge, and immediately below this point, in cutting through a mountain range, it flows in a narrow cañon. A few miles above Mandalay it enters a broad plain, through which it passes; a hundred miles below Mandalay it is joined by the Chindwin, its largest branch. Its delta is very extensive, being nearly 200 miles in length, with an area of 18,000 square miles. These delta lands are extremely fertile, are densely populated, and are highly cultivated. The mean discharge of the river at its mouth is estimated at 480,000 cubic feet per second, or about the same as that of the Ganges. It is subject to great floods in the rainy season, the flow at this time being often eighteen times as great as at low water. It is navigable for large river steamers as far as Mandalay, and for smaller craft some distance above Bhamo.

The Salwin is second only to the Irrawaddy in volume. This river throughout its course in Burma flows in a narrow valley, hemmed in by mountains, and affording little level land for cultivation. It is navigable for only a short distance, owing to frequent rapids. The Sittang heads south of Mandalay, and flows in a broad valley between the Irrawaddy and the Salwin. There are hundreds of minor streams in this well-watered country, but as they partake of the nature of mountain torrents, or are fed by them, they are useless for navigation, at least during the dry season. After the rainy season has begun the larger rivers are crowded with the native boats, for the waterways are the highways of the country. Even before the rain sets in the great rivers begin to swell, owing to the melting of the Himalaya snows. Toward the beginning of July the rivers and their tributaries usually rise ten to twenty feet, submerging their banks and flooding the low lands. In many places, where in dry weather a cart-track is found, there is, during the wet season, a creek navigable by heavily laden boats. The whole aspect of the country and the mode of life are thus changed with the alternations from dry to wet seasons. The villages of the delta are accessible by water, and it is at this season that the heavy traffic of the country is carried on. At Mandalay, where the Irrawaddy is about 2 miles wide, the water rises 30 feet, and in the Salwin there is a rise of 50 feet. These high-water levels are maintained with some fluctuations till September.

CLIMATE. The climate of Burma ranges from that of the eastern Himalayas on the north to that of the tropical oceanic regions on the south, most of the country being in the torrid zone. The monsoons have a powerful effect upon the climate; in winter they blow from the north and northeast off the land, and produce the dry season, and in summer they blow from the south and southwest off the sea, causing a heavy rainfall on the coast, and, moving up the river valleys, they carry a heavy precipitation far inland. The rainfall on the coast ranges from 120 to 160 inches, and is much greater than this in some special localities. In the interior it is distributed irregularly, being affected by the local topography, but it is almost everywhere ample in amount, and in many places excessive, ranging from 40 to 160 inches. The temperature changes with the latitude and altitude and proximity to the sea, and with the direction of the monsoons. The coast temperatures are very constant, ranging from 80° to 90°. In the interior the contrast is greater, the temperature ranging from 50° or 60° in winter to 80° or 90° in summer, while at considerable altitudes, in the north, the country is subject to frosts in the cold season. The great fertility of the soil in Burma is further increased in the lowlands by the fertilizing overflows of the rivers.

FLORA. All the land not under cultivation is clothed with dense tropical forests, containing many fine dye and cabinet woods; and in the northern part of the country there is a great deal of teak, one of the most important exports. This wood has a peculiar odor, due to the presence of an oil which repels insects and protects it from decay. The oil-tree, yielding gallons of oil every season, is found at the headwaters of the Salwin. Ironwood, which grows in among the bamboo, is abundant and widely utilized. Below the upper forests are the sandstone and laterite, on which the forests are open and stunted. Other trees are the palm, cocoanut, betel, and palmyra. Breaking the ever-green monotony of the riverside is the nipa-palm, with immense fronds somewhat like the cocoanut. The

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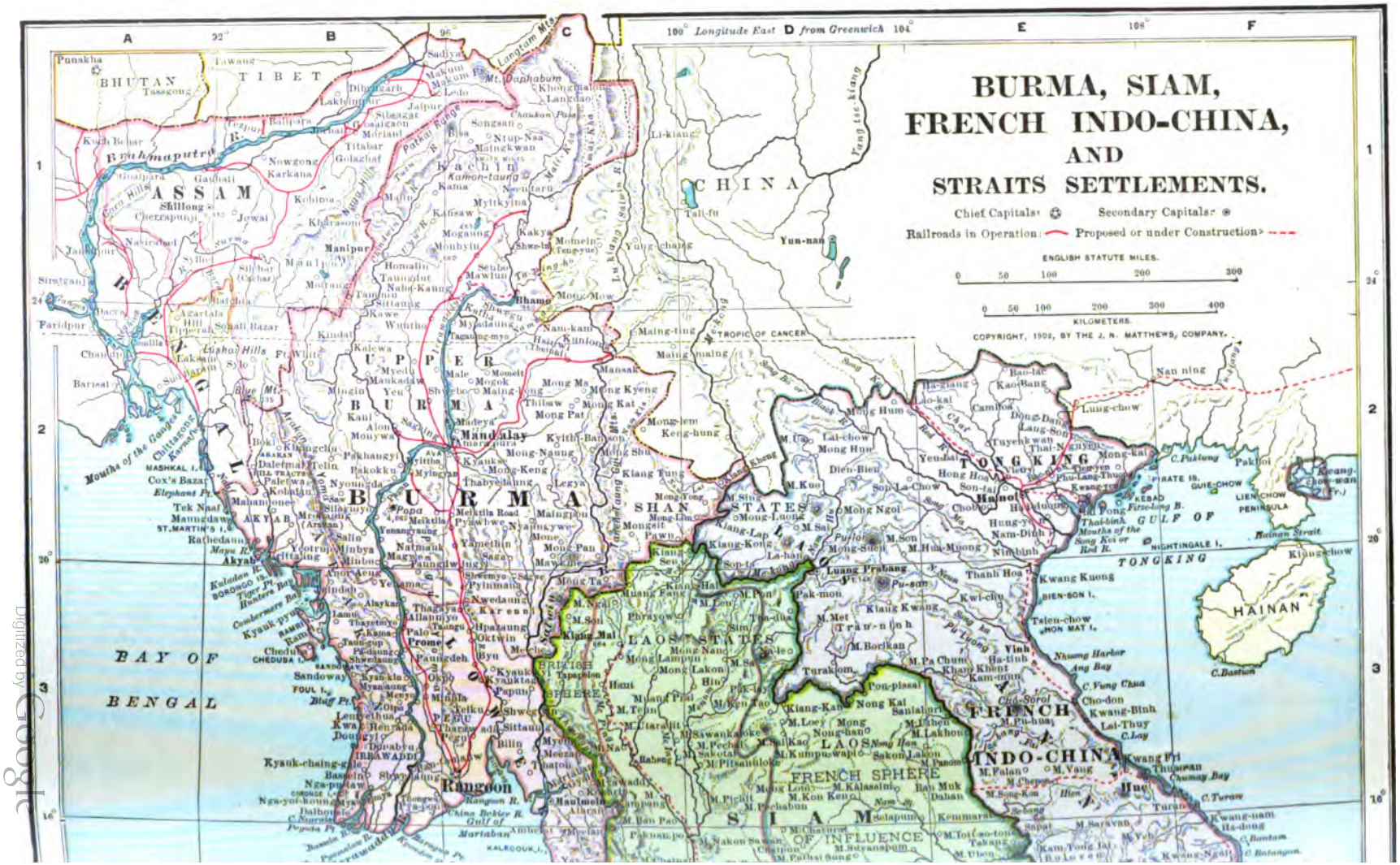
BURMA, SIAM,
FRENCH INDO-CHINA,
AND
STRAITS SETTLEMENTS.
Chief Capitals
Secondary Capitals
Railroads in Operation
Proposed or under Construction
ENGLISH STATUTE MILES.
KILOMETERS.
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Longitude East from Greenwich
TROPIC OF CANCER
BHUTAN
TIBET
CHINA
ASSAM
BURMA
UPPER BURMA
SHAN STATES
LAOS STATES
BRITISH SPHERE
FRENCH SPHERE OF INFLUENCE
SIAM
FRENCH INDO-CHINA
TONGKING
GULF OF TONGKING
HAINAN
BAY OF BENGAL
Mandalay
Rangoon
Hanoi
Haiphong
Vinh
Luang Prabang
Yun-nan
Tali-fu
Li-kiang
Mouths of the Ganges
Mouths of the Red R.
Hainan Strait
Kiung-chow
Lung-chow
Nau-ning
Pak-hoi
Kwang-chow-wan (Fr.)
Kwang-nam
Ha-dong
Bantam
C. Batangan
C. Turane
C. Bastion
C. Paklung
Kwang Knong
Talen-chow
Nhung Harbor
Ang Bay
C. Vung Chua
Cho-don
Kwang-Binh
Lai-Thuy
C. Lay
Thuonan
Chumay Bay
Kwang Tri
Hue
Turan
Kwang-Ngai
Kyauk-chaing-gale
Nga-pu-lawa
Nga-yot-koungaing
Dalhousie
C. Negrais
Pegu Pt.
Rangoon R.
China Bohler R.
Gulf of Martaban
Kalegouk I.
Mouths of the Ganges
Chittagong
Karnaphuli
MASHKAL I.
Cox's Bazar
Elephant Pt.
Tek Naaf
Maungdaw
ST. MARTIN'S I.
Ratledaung
Akyab
Kuladan R.
BOROGO I.
Tiger Pt.
Hunters Bay
Cowlemerre Bay
Kyauk-pyu
RAMRI I.
Cheduba I.
CHEDUBA I.
Sandoway
FOUL I.
Bluff Pt.
Lemethna
Kwa
Ronnada
Dougryo
Dipabyu
IRRAWADDY
Basseln
Shwe-laung
Bassein
Pyapon
Bhamo
Myitkyina
Kamon-taung
Kachin
Mogaung
Kathe
Shwebo
Monywa
Kalewa
Myedu
Mankadaw
Mingin
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Paungde
Okpo
Minhla
Pegu
Tharawaddy
Sittaung
Bilin
Myeni
Meezalee
Thaton
Maulmein
Alacan
Kyaukta
Papun
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Pyinmana
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Mandalay
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Mong-Keng
Mong-Ma
Mong Kyeng
Mong Kat
Mong Pat
Thibaw
Mansak
Mong-lem
Keng-hung
Mong-Hun
Lai-chow
Mong Hun
Dien-Bien
Son-La-Chow
Mong Ngoi
Mong-Luong
Mong-Sueik
Luang Prabang
Pu-son
Pak-mon
Klang Kwang
Tran-ninh
Turakom
Pon-pissai
Nong Kai
Sanlaburi
Kiang-Kan
Nong-ban
Sakon Lakon
Ban Muk Dahan
Kemmarat
Ubon
Takang
Chaiyaphum
Pakhanpo
Nakon Sawan
Chaiyo
Pathai Song
Bangkok
Ayuthia
Pitsanulok
Sawankalok
Sukotai
Pechabun
Kumpuswapi
Kalasaloi
Mong Loun
Kon Keu
Pichit
Ban Pao
Tenasserim
Mergui
Tavoy
Kyaukpyu
Ramree
Sittang R.
Irrawaddy R.
Salween R.
Mekong R.
Red R.
Black R.
Song Ka R.
Song Ma R.
Song Bo R.
Song Chay R.
Pa Tuong R.
Nam Ma R.
Nam Ou R.
Nam Ngum R.
Nam Mun R.
Nam Pong R.
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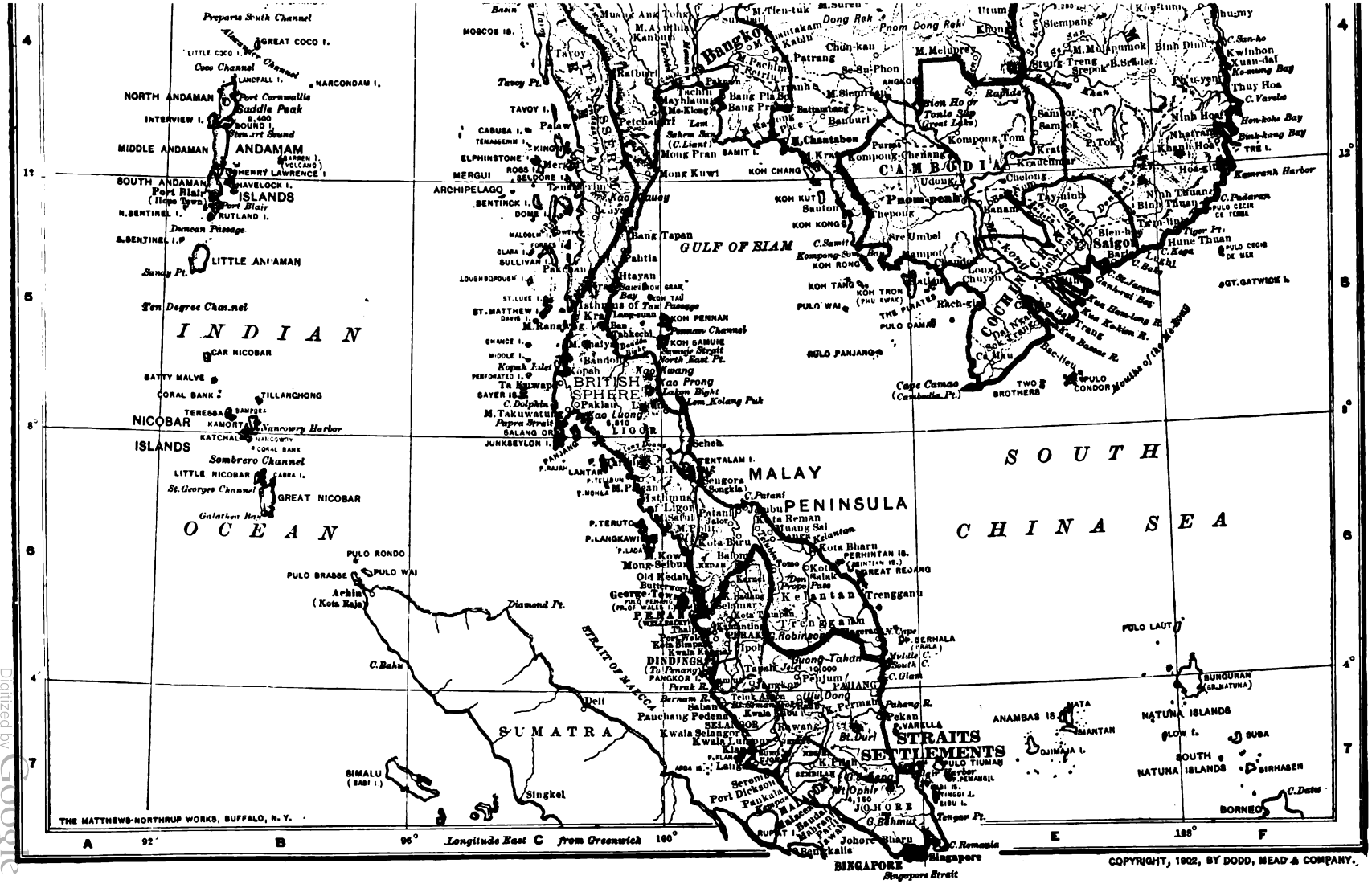

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bamboo is universal and exceedingly useful. Planted in front of the houses are cocoanut and betel palms, giant bamboo, tamarind, mango, and jack, useful for their fruit and shade. The screw pine, castor-oil plant, crotons, begonias, caladiums, balsams, are cultivated in many places. Other fruits are limes, citrons, jujube, guava, cashew, custard-apple, orange, mangosteen, and durian, the latter being highly prized. The plantain and banana are the leading fruits of Burma; pineapples and many garden vegetables also abound.

FAUNA. Elephants, rhinoceroses, tigers, leopards, four species of deer, buffaloes, oxen, and goats, bears, tapirs, boars, wildcats, monkeys, gibbons, and crocodiles furnish game for the hunter. The Asiatic elephant attains a larger size here than elsewhere.

Burma is, in fact, the land of elephants; they are not only still plentiful in the wild state, but are used to a large extent as draught-animals. The ox, horse, and buffalo also serve the purposes of labor, and especially among these the buffalo, which is a valuable draught-animal in the muddy regions. Peacocks (the national emblem), silver pheasants, and jungle-fowl of various sorts abound, as do also many other birds that are hunted for sport and food. Rats are almost a plague in the north provinces.

MINERAL RESOURCES. Burma is believed to be very rich in mineral resources, though little beyond a rough survey has been made, and most of the gold and silver used is imported from China, India, and Europe. Some of the rivers contain gold in the sand, which is washed out by the natives. Silver, copper, lead, iron, antimony, bismuth, and tin are also mined, but not, as yet, in large quantities. Nitrates, salt, limestone, and amber, serpentine, coal in abundance, and petroleum are found. The chief mineral wealth thus far developed has come from the mines of jade, amber, ruby, and sapphires, which are discovered in the sand and gravel of Upper Burma. Mining is still in its rudimentary stages, but in recent years modern machinery has been introduced, and the amount of metal obtained from the ore, and the size of the slabs of the more valuable kinds of stone, are much larger than formerly. The finest variety of white marble found near Mandalay is much used in the Buddhist sculptures, and in the decoration of temples.

AGRICULTURE AND OTHER INDUSTRIES. Like most Indian provinces, Burma is chiefly agricultural. The prevailing system of tenure is the *ráyatwári*, i.e. the farmer leasing his land directly from the State, and being assessed a tax in proportion to the area cultivated. The main agricultural product is rice, grown almost exclusively in the lowlands. About one-tenth of the area of the province can be utilized for the cultivation of rice. The extension of rice-culture has been very rapid, and Burma is now looked upon as a chief source for the world's supply. Out of a total area of over 9,500,000 acres under cultivation in Upper and Lower Burma in 1899-1900, over 8,000,000 acres were in rice, and the remainder in grains, oil-seeds, cotton, tobacco, sugar-cane, tea, and indigo. The methods of cultivation are primitive, and elephants are not infrequently used in farming. The native religion prohibits meat-eating, consequently there is no raising of cattle for beef. Burma has few large manufacturing establishments. The weaving of silk in Lower Burma and of cotton in Upper Burma is almost universal. Pottery is also produced extensively in both parts of the country. A number of industries are carried on on a small scale, often as adjuncts to agriculture. There are many skillful workers in gold, iron, and wood, and the native products have high artistic value.

COMMERCE AND TRANSPORTATION. The commerce of Burma has developed along with agriculture, and as the largest product is rice, it is also the chief article of export, usually constituting about 80 per cent. of the total exports. The foreign trade is wholly controlled by foreigners, mostly English and Chinese, while the internal trade is in the hands of the natives. Usury prevails to a great extent, the rate of interest ranging from 1 to 6 per cent. per month. The sea trade of the province (excluding Government imports and exports) steadily increased from $75,000,000 in 1891-92 to $101,200,000 in 1899-1900. In 1899-1900 the excess of exports over imports was Rs.6,00,00,000 ($19,440,000). Besides rice, the exports include teak, about 9 per cent.; catechu; raw hides, 2.4 per cent.; raw cotton; india-rubber, about 2 per cent. The imports embrace cotton, wool, and silk goods, raw silk, metals and metal products, and fish. The foreign trade is with Great Britain and its colonies, and to some extent with America. The inland trade, at the end of the century, was a little over Rs.3,00,00,000 ($9,720,000), of which about 60 per cent. was with Western China, and the rest with the Shan States and Siam. Rangoon is the chief commercial centre of the province, and receives about 80 per cent. of the total trade. The merchant marine numbers over 6200 vessels, with a total tonnage of over 4,000,000.

Under British rule new systems of roads and bridges have been introduced, three navigable canals dug, the Irrawaddy embanked and furnished with a large fleet of steamers, the chief cities fortified in modern style, and hospitals, court-houses, and churches built in many places. The chief railways extend from Rangoon to Mandalay and Myitzyina, with a branch from Meiktila to Myingyan, and one from Rangoon to Thayetmyo. From Mandalay the road extends into the region of the jade and amber mines. Another road is projected from Mandalay to Kun-lon, which is the Mandalay-Salwin line. It is on this line, between Mandalay and Kun-lon, that the famous Gokteik viaduct has been built over the gorge through which flows Chunzzoune Creek. Here, 500 feet above the water, rises a remarkable natural bridge of limestone, and upon the top of this freak of nature rests the 320 feet of steel trestle-work that forms the Gokteik viaduct—2260 feet long and about as high as the towers of the new Brooklyn bridge. All the material and skilled labor in connection with that structure came from the United States. In 1896 this Burma Railway Company, with a capital of $10,000,000, had 1000 miles open to traffic, the Government guaranteeing interest at 2½ per cent., and a participation in the surplus profits. The roadbed passes through jungles not long since occupied by elephants and tigers.

GOVERNMENT. Burma, before it came under the rule of Great Britain, was a despotic monarchy, though the King, or 'Lord of the White Elephant,' was assisted by a high council of four Ministers of State, who gave or-

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ders to the governors of provinces. The Hindu Code of Manu, translated into Burmese, served as a body of laws; decrees were often issued by the King; but custom played the most important part in the legal system. The insignia of royalty were the white elephant and white umbrella. There was no hereditary nobility, but rank was conferred by office, and its various degrees were indicated by the different shades of garment, furniture, or utensils, and especially by the color of umbrellas. The lower grades of office, however, were, and still are, hereditary. This is especially true of the headmen, who levy the taxes from the people. The extortion of officials frequently drove the villagers to assassination; the common term for 'the people' was 'the poor,' and the popular category of the five enemies were Fire, Water, Robbers, Rulers, and Ill-wishers. The governors and deputies who acted as judges heard cases in an open shed in a public place, but every cause was presented in the first instance at the official's house, to which none could come empty-handed. The village elders constituted the ultimate tribunal of government, and they were consulted by the officers on all matters affecting the people. Burma is now under the Viceroy of India, and is governed by a Lieutenant-Governor, assisted by a Legislative Council at Rangoon. In each of the eight divisions is a commissioner, who is the chief judicial and executive officer. Each division is again subdivided into districts, townships, and village communities, in which Burman magistrates preside. The headmen of the village still retain local police and revenue powers, and each village has its judicial commissioner and recorder. The police force is made up of natives and Indians, under the command of European officers. There are 37 districts, about 500 magistrates under salary, and 125 native honorary magistrates. The chief revenue sources are the tax on land, amounting to about 40 per cent. of the total; the poll-tax (4 rupees per head); customs; forests; opium and salt monopolies; and the income tax. In 1899-1900 the revenues and expenditures of Burma were Rs. 7,04,36,240 ($24,650,000) and Rs.4,57,33,116 ($16,006,600), respectively.

The principal towns of Burma are Mandalay, Rangoon, and Maulmain.

POPULATION. In 1901 the inhabitants of Burma, mostly native, numbered 9,221,161, the increase being over 18 per cent. since 1891. The original Burman tribes are believed to have descended southward from Tibet. The tribe of Bama, or Burma, settled on the northern Irrawaddy, where they came into contact with the Peguan or Mun race, probably of Annamitic origin. The Burmans are Mangoloid, with a suggestion of the Aryan, with flat faces and broad skulls, black hair, rich brown skin, and brilliant black eyes. They are usually well-formed, medium-statured, thick-set, the men being fond of athletics. They wear a simple dress, consisting of *paso* and *tamein*, the former for men, 10 yards long and a half-yard wide, which is hitched round the loins and disposed in various ways over the body, making a dress without buttons or strings, but with pockets and infinite capacities. The woman's garment, only 4½ feet long, is of cotton, silk or calico. The white cotton coat is common to both sexes. The old costume seems now to be giving way to a new tartan-like dress or garment, about 9 or 10 feet long. On their heads they usually wear a knot of their own hair or bright-figured silk kerchiefs. They are very fond of personal decorations, and the native jewelers are expert at gold and silver work. The smoking of tobacco and the chewing of betel-nut are almost universal. The houses, usually set on piles, on account of river floods, are made of bamboo, laid on timber framework, and covered with the leaves of the palm, or by other suitable vegetable leaf and fibre. The Burmese are fairly industrious, but the women excel the men in variety of domestic employments. They are temperate and hearty, but not fond of continued labor. The number of festivals is very great, and they are enthusiastically kept and enjoyed by the people at large. Among the amusements may be mentioned boxing matches, pony, bullock, and boat races, cock-fighting, 'splitting the cocoanut,' chess, dominoes, and various sorts of juggling, snake-charming, etc. The Burman is excessively fond of pageants and frolics. In theatrical representations, as a rule, the hero and heroine are prince and princess, the countryman is a jester or clown, and the King's officers are courtiers or executioners. The King is consistently idealized, while his deputies are travestied. The ballet is very gay and animated, the dancers dressing in superb costumes. The entertainment often lasts several days or nights in succession, and it may consist of dialogues, music, interludes of dancing and posturing.

Other races besides the Burmans proper dwell within the limits of Burma; the Shans inhabit the eastern highlands, where they have semi-independent States, and the Kachins the northern. The Karens, in many respects an interesting people, are the most important hill race of the country, and best exemplify the mode of life of the aboriginal tribes, who have been kept out of the plain-lands by the more powerful Burmans. Those living in the mountains between Burma and Siam get their living by making forest clearings, on which they raise one crop, removing to another site every season. Those settled in the lowlands are more civilized, and speak and dress like Burmans. Noted for their hospitality, truthfulness, chastity, and spirit of equality, they are nevertheless given to drunkenness and to superstition. They are shorter and stouter than the Burmans, and of much fairer complexion. They employ elephants, and are good hunters, and do not marry until reaching mature life.

The language of the Burmese belongs to the same group as the speech of the Annamese, Siamese, and others speaking monosyllabic tongues. The alphabet seems to be a rounded form of Pali. The forms of speech tend to preserve relative ideas in the same categories as the terms expressing the ideas. The root remains unaltered; thus, instead of our 'herb,' 'shrub,' 'tree,' the Burman speaks of grain-plants, creeper-plants, timber-plants. Written Burmese literature goes back for over 800 years, and it is everywhere colored by Hindu influences.

RELIGION. The Burmese are the practical Buddhists of the world, their religion being of the Southern (Ceylonese) or purer variety, which most closely approximates the original form taught by Gautama. Even the Siamese are lax in comparison to the Burmese. Burma, isolated geographically between the mountains and the ocean, has remained, since the Fifth

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Century, thoroughly imbued with Buddhism. It has been their great teacher and civilizer, stimulating the growth of a folk-lore and a national literature. It has prevented caste, and has covered the settled part of the country with temples, shrines, and monasteries, the latter being well organized. Theoretically, every boy in the country, while at the temple school, becomes a monk, though he is not bound by vows to remain. Tolerant and free from fanaticism, as well as from blood feuds, the Burmans show the blessings of the gentle teachings of the purer Buddhism. In sacred edifices the country is very rich; the tope, dagoba, or shrine is a solid mass of brickwork, shaped like a bell and crowned by an umbrella-like open ironwork. The temples contain many images of the Enlightened One, or Gautama, the Buddha of history; and the people never tire of plastering these images over with gold-leaf. The temples bristle on the sides and top with pointed projections which are usually gilded. The most famous temple in the country is in Pagan, a city founded A.D. 100. It flourished about A.D. 1000, and later fell into decay, its ruins covering nearly eight square miles. A tremendous expense was incurred in temple-building. At every shrine great bells are hung by metal clasps of rich design. At Mingum, near Mandalay, the bell, cast in 1790, weighs 88 tons. It is 17 feet in diameter, and the metal is 18 inches thick. The monastery buildings have roofs of several diminishing stages, elaborately adorned, but the special feature of Burman architecture is the pointed arch, used not only for doors and windows, but also in the vaulted coverings of passages. The ancient temples of Pagan consisted almost entirely of brick corridors, one within the other, with vaulted tent roofs, of masonry springing from the outer or lower wall to the inner or higher. Among the non-Buddhist tribes, spirit, nature, or demon worship prevails in more or less degrading form.

The early history of Burma is mythical and obscure. As is the case with many other peoples, the legendary accounts, preserved in old chronicles of the country, seem to point to an early immigration of the dominant race. It is supposed that the ancestors of the modern Burmese came from the Indian Highlands, on the northwest, at a period from 2000 to 2500 years ago; entered the valley of the Irrawaddy, the great river highway along which the whole history of Burma has been enacted; conquered the Mongoloid peoples then inhabiting the country, and gradually built up a new State. Tagoung, on the Upper Irrawaddy, the ruins of which still remain, is reputed to have been founded about B.C. 800. In the Eleventh Century A.D. Pagan, in Central Burmah, was the seat of power; its Kings consolidated the country, and conquered the land of Pegu on the south. The power of Pagan declined through the decadence of its rulers, and received a fatal blow from the assault of the Mongols, in the time of Kublai Khan. The Fourteenth Century saw the rise of the power of the rulers of Ava, the new centre of the kingdom, and the beginning of the long rivalry between Ava, the northern kingdom, and Pegu, in the south. The chronicles of the Kings of Ava claim for them descent from early Buddhist rulers in India, even going back to Gautama himself. The power of Ava reached its zenith in the Fifteenth Century, when the history of the country becomes clearer through the accounts of Portuguese and other European traders, who entered the country and described its conditions. The supremacy passed temporarily from the Burmans to a line of kings from the Shan tribes on the Siamese border; but in 1580 the southern kingdom of Pegu became dominant over all Burma. The Peguan supremacy continued until 1752, but during the last century of this period there was a steady decline of the Burmese power. The French and English, meanwhile, secured a foothold in the Irrawaddy delta. In 1752 Alaunghpra, or Alompra, the energetic warrior-chief of a village of Ava, headed a rising, overthrew the dominion of Pegu, and reorganized the Burmese Empire. He founded Rangoon (1755), the commercial centre of Burma. Troubles began in his reign with the English East India Company, which had established a factory in Burmese territory. Alompra died in 1760, during an invasion of Siam. The dynasty which he founded degenerated rapidly through intermarriage among its members. With one exception, Mindohn Min (1852-78), the successsors of Alompra were bloodthirsty and tyrannical.

In 1795, in consequence of the violation of British territory by a Burmese force in pursuit of certain rebels, troubles arose, which were, however, quieted for a time. Difficulties over trading privileges followed, and frontier disputes occurred, culminating, in 1824, in a collision between armed forces of the East India Government and of Burma, on the Assam frontier. War was declared, and British forces at once invaded Burma. The common error of British campaigns, that of despising an unknown foe, led to failures at the beginning, but ultimately the Burmese were pressed so hard that a treaty was made at Yandabo, February 24, 1826, by which Burma renounced its claim on Assam and ceded to the British Government Arakan and the coast of Tenasserim, including Martaban, east of the Salwin River. Their defeat was a great blow to the national pride of the Burmese. King Tharawaddy, who obtained the throne in 1837 by the deposition of his brother, declared the treaty of Yandabo void, and treated English envoys with studied contempt until, in 1840, relations between the British and Burmese Governments ceased altogether. The extreme development in Tharawaddy and his son, Pagan Men, of the homicidal mania, which was the curse of the line of Alompra, led to a revolt which, in 1853, seated the brother of Pagan Men, Mindohn Min, on the throne. At the same time the intolerable treatment of English citizens had brought on the second war between Great Britain and Burma. In the spring of 1852 a British force captured Martaban and Rangoon, and the Peguans took the part of the British against the Burmese. In January, 1853, Pegu was proclaimed a part of the British Empire, which thus obtained control of the Burmese coast and of the mouths of Burma's three navigable rivers. Mindohn Min proved to be a wise and just ruler. Diplomatic relations were resumed in 1867 between Burma and Great Britain, and a commercial treaty was made. Two years before, a superstition had caused the abandonment of

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the capital, Amaurapoora, for the new city Mandalay. Mindohn Min died in 1878, and the principal Queen, having no sons, married one of her daughters, Supayah Lat, to Theebaw, one of the youngest of the late King's sons. The other princes were seized and executed. Theebaw, arrogant, cruel, and weak, was a tool of his sanguinary Queen, who put all her rivals to death. The disorder resulting from the tyranny of their rule affected British trade, and led to new troubles with Great Britain; while an effort was made to establish a favorable connection with France. Trouble between the Burmese Government and the Bombay-Burma Company, which held a concession in the teak forests, presented an excuse for British intervention, which seemed necessary to prevent French influence from becoming paramount. The British invaded Burma, and on November 28, 1885, occupied Mandalay. The King and Queen were made captive and taken to Madras; all of Burma passed into British control, and in 1886 the annexation of Upper Burma to the dominions of the Queen-Empress Victoria was formally proclaimed. For several years there was much lawlessness, chiefly in the form of brigandage by the *dacoits*, or robbers, but by 1895 the country was practically pacified, and entered upon a new era under British rule. It is incorporated as a province of the Indian Empire under a Lieutenant-Governor. An agreement was concluded with France on January 15, 1896, making the Mekong River the boundary between the Shan States of Burma and French Indo-China. This boundary agreement gave France some territory east of the Upper Mekong, which formerly belonged to Burma. The development of railroads in Burma has now begun, and will open the resources of the country. The connection of Shanghai with India by way of the Upper Yangtse Valley and Upper Burma is claimed by some students of the Far Eastern situation to be essential to the maintenance of Great Britain's position in the East. See FAR EASTERN QUESTION.

BIBLIOGRAPHY. Spearman, *The British-Burma Gazetteer*, compiled by authority (Rangoon, 1880); Schmitz, "Birma, die östlichste Provinz des indischen Kaiserreichs," in *Mitteilungen der geographischen Gesellschaft* (Vienna, 1898); Mason, *Burma: its People and Productions*, notes on the fauna, flora, and minerals, etc., rewritten and enlarged by Theobald (Hertford, 1882-83); Bird, *Wanderings in Burmah* (London, 1897); Ferrar, *Burmah* (London, 1898); Hart, *Picturesque Burma—Past and Present* (London, 1897); Yoe, *The Burman, his Life and Notions* (2d ed., London, 1896); Smeaton, *The Loyal Karen of Burma* (London, 1886); Phayre, *History of Burma* (London, 1883); Harmer, *The Story of Burma* (London, 1901); Yule, *Narrative of the Mission in 1855* (London, 1858); Geary, *Burmah After the Conquest* (London, 1886). The writings of Archibald Colquhoun deal with the railway and frontier problems affecting Burma. An account of missionary activity in Burma will be found in Wayland, *Life of Adoniram Judson* (Boston and London, 1853).

BURMANN, bōōr'mán, PETER (1668-1741). A Dutch philologist. He was born in Utrecht, and studied law at the universities of Utrecht and Leyden, taking his degree in 1688. After practicing as an advocate for some years, he was appointed professor of history and rhetoric, and later became professor of Greek in Utrecht. In 1715 he removed to the University of Leyden. His chief works are editions of the Latin classics—Petronius, Velleius Paterculus, Quintilian, Valerius Flaccus, Phædrus, Ovid, the Poëtæ Minores, Suetonius, Lucan, Horace, and Vergil. They are characterized less by critical acumen than by learning and fullness.

BUR-MARIGOLD. A popular name of the widely distributed genus Bidens, of the order Compositæ. This genus includes a large number of annuals and perennial plants among which, in America, are the weeds called 'beggar-ticks,' 'Spanish needles,' and 'stick-tights.' Some species have very showy flowers, one of the finest in cultivation being the *Bidens grandiflora*, a native of South America. The botanic name *Bidens* is descriptive of the bidentate top of the seed or pappus.

BURMEISTER, bōōr'mīs-tĕr, HERMANN (1807-92). A German naturalist, born in Stralsund. He studied medicine and natural history at Halle, and in 1837 became professor of zoölogy there. In 1848 he was a deputy to the German National Assembly, and afterwards was a representative in the first Prussian chamber. In 1850 he traversed part of Brazil in the interest of science, and visited other parts of South America a few years later, becoming in 1861 director of the National Museum at Buenos Ayres, where he died. He published many elaborate works on zoölogy, among them *Handbuch der Entomologie* (1832-55); *Systematische Uebersicht der Tiere Brasiliens* (1854-56); and *Physikalische Beschreibung der Argentinischen Republik* (1875).

BURMEISTER, RICHARD (1860—). A German-American pianist and composer, born in Hamburg. He studied under Liszt in 1881-84, made concert tours through Europe in 1883-85, and from 1885 to 1897 was the head of the piano department of the Peabody Institute in Baltimore. From 1897 to 1899 he was director of the Scharwenka Conservatory in New York City. His compositions include a concerto in D minor for pianoforte and orchestra, a ballade for pianoforte, an arrangement for pianoforte and orchestra of Liszt's *Concerto Pathétique*, for two pianofortes: *The Chase After Fortune* (described as a 'symphonic fantasy'), for orchestra; and a reorchestration of Chopin's F-minor concerto.

BURMESE (bûr-mēs' *or* -mēs') **WARE** (first imported from Burma). Small cups and other vessels, made of strips of bamboo woven like fine basketwork, with the interstices filled with paste made of wood-oil and fine powders. When sufficiently hardened, the surface is smoothed with pumice-stone and water.

BURMESTER, bōōr'me-stĕr, WILLY (1869—). A German violinist, born in Hamburg. He studied in 1882-85 under Joachim at the musical high school in Berlin, became known for the brilliancy of his technique, and in 1890-91 was an instructor in the conservatory of Sondershausen. In 1895, at the instance of Georg Henschel, he appeared in England.

BURNABY, FREDERICK GUSTAVUS (1842-85). An English traveler and soldier. He was born

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in Bedford, England, and was educated at Harrow and in Germany. Early in his life, he displayed his fondness for adventure. He entered the army in 1859, and by 1881 had command of his regiment, but he spent much of his time in travel, going first to Central and South America. He was military correspondent for the London *Times* with Don Carlos in Spain; and by that journal was sent to join Gordon in the Sudan. In 1875 he undertook his famous ride to Khiva, making his way, unaided and alone, to the heart of Asia, notwithstanding the Oriental laws forbidding the passage of foreigners into certain districts, and the efforts of the Russians to intercept him. In 1876-77 he rode on horseback through Asia Minor, and from Scutari to Batum. In 1880 he contested unsuccessfully, in the Conservative interest, the Birmingham seat in Parliament. He took part in the Egyptian campaign, and was killed in an engagement with the Mahdi's troops in January, 1885. Two of his books, in which he describes his exploits, reached enormous circulations: *A Ride to Khiva* (1876) and *On Horseback Through Asia Minor* (1877). They are both marked by strong anti-Russian and 'jingo' sentiments.

BURNAND', Francis Cowley (1837—). An English writer. He was educated at Eton and Cambridge, and was called to the bar in 1861. His success as a writer of burlesques led him to adopt literature as a profession. He has produced nearly a hundred dramatic pieces, among which *Ixion* and the burlesque of Jerrold's *Black-Eyed Susan* had remarkable runs. He became one of the leading contributors to *Punch*, and in 1880 succeeded Tom Taylor as its editor. From the pages of that periodical he has collected a number of volumes, among which the best known are *Happy Thoughts* (1870); *More Happy Thoughts* (1871); *Happy Thought Hall* (1872); *Quite at Home* (1890). He has also written two light operas in collaboration with Sir Arthur Sullivan.

BURNE-JONES, Sir Edward Coley, Bart. (1833-98). An English painter. He was born in Birmingham, August 28, 1833. He was intended for the Church. In his youth he was sent to King Edward's Grammar School in his native town, and entered Exeter College, Oxford. There he formed his intimate and lifelong friendship with William Morris, who, himself leaning to poetry and the decorative arts, encouraged Burne-Jones as well to seek art as a career. Later, in London, Dante Gabriel Rossetti also strove to impress upon him the same idea. So, under the influence of these two men, Burne-Jones cut short his university course and established himself in London, with Rossetti as his master. In order to support himself while studying and painting, he designed numerous cartoons for stained-glass windows. Among these works is the Saint Cecilia window at Christ Church College, Oxford. Burne-Jones early made the acquaintance of Ruskin, whose writings, no doubt, greatly influenced him in his art. Of the Pre-Raphaelite painters of that period (see Pre-Raphaelite School) he seems to have been the one who in time became most completely emancipated from the vagaries and extravagances that marked the early works of that school, and by his serious devotion to art made himself worthy of the cult and following which he afterwards created. A man of wide culture and great poetic feeling, he naturally found inspiration for his brush in romantic legends and classic song and story. His master, Rossetti, says of his pictures that "they exhibit gorgeous variegation of color, sustained pitch of imagination, and wistful, sorrowful beauty, all conspiring to make them not only unique in English work, but in the work of all times and all nations." Burne-Jones has been extravagantly worshiped and praised, while at the same time his work was subject to the most bitter detraction. It was even held up to ridicule in the pages of *Punch*, and he himself alluded to by W. S. Gilbert in *Patience* as the 'greenery-yallery, Grosvenor-gallery' young man. But years of patient, cheerful, dignified work, marked by strong personal thought and expression, brought Burne-Jones at last to a sound reputation. He was made a D.C.L. of Oxford, was decorated with the French Legion of Honor, and in 1894 was made a baronet. The Royal Academy also elected him an associate in 1885, but as it did not further advance him to the full honors of academician, he afterwards resigned the associateship. Among his best-known works are "Venus's Mirror," "Chant d'Amour," "The Golden Stair," "The Wheel of Fortune," and "Cophetut and the Beggar Maid." Among his finest water-color drawings are the "Wine of Circe," "Love Among the Roses," "Dies Domini," and "Spring, Summer, Autumn, and Winter." Burne-Jones died in London, June 17, 1898. Consult Bell, *Edward Burne-Jones* (London, 1892).

BUR'NELL, Arthur Coke (1840-82). An English Sanskrit scholar, born in Saint Briavels. He studied at Bedford and King's colleges, and from 1860 to 1880 was connected with the civil administration of India. Everywhere he bought or copied Sanskrit MSS., 350 of which he presented in 1869 to the India Library. For the Madras Government he compiled what is, perhaps, his greatest work, a *Classified Index to the Sanskrit MSS. in the Palace at Tanjore* (1880). He was versed in Sanskrit and the dialects of Southern India, and also knew something of Javanese, Coptic, and Tibetan. His *South Indian Palæography* (1874, 2d ed., 1878) has been characterized by Prof. F. Max-Müller as "indispensable to every student of Indian literature." He further published translations from, and commentaries on, numerous Sanskrit MSS.

BURNES, Sir Alexander (1805-41). A British officer and traveler. He was born in Montrose, Scotland, and belonged to the same family as Robert Burns, the poet. He early entered the Indian Army, and through his knowledge of Oriental languages gained rapid promotion. After undertaking several important missions for the Indian Government he was sent to explore the countries bordering on the Oxus and the Caspian. For greater safety, he adopted the dress and usage of the Afghans. On his return to England he was highly honored by the Royal Geographical Society and other associations, and was lionized generally. In 1839, having previously been knighted and promoted to the rank of lieutenant-colonel, he was appointed political resident at Kabul, where he was murdered on the breaking out of the insurrection in that city. He published *Travels into Bokhara* (2d ed. 1829).

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BURNET (OF. *brunete;* cf. Med. Lat. *burneta,* springwort). The name of two allied and often united genera of Rosaceæ—Sanguisorba and Poterium. Sanguisorba has hermaphrodite flowers with four stamens; in Poterium the flowers are polygamous and the stamens indefinite in number. In both the calyx is four-parted and the corolla wanting. The great burnet (*Sanguisorba officinalis*) is common in meadows in all parts of Europe, particularly where the soil is calcareous. It has a stem 1 to 2 feet high, pinnate leaves, with about four pairs of ovate-serrated leaflets and an odd one; the flowers are crowded in dark-red spikes. In Germany it is grown as a forage crop for cattle. The root is astringent, and was formerly used in medicine. The common or lesser burnet (*Poterium sanguisorba*) grows on dry, calcareous soils in England and in central and southern Europe. It much resembles the great burnet, but the leaflets are smaller, and the reddish-green flowers are arranged in dense heads on long furrowed stalks. It is very resistant to drouth and cold, and its culture for forage has been recommended on dry, calcareous soils. Although it forms a great part of the natural pasture of the South Downs and other sheep-raising districts of England, it is not generally regarded as a very valuable forage plant. It is sometimes cultivated in gardens for its slightly astringent leaves, which are used for flavoring soups and salads. This plant has been introduced into North America, and grows wild in the northeastern part of the United States. Both this and the preceding are perennial plants. There are several other species, both of Sanguisorba and Poterium, some of the latter shrubby, natives chiefly of the warmer temperate parts of the world. *Poterium Canadense* is found in the northeastern United States.

BURNET, GILBERT (1643-1715). A British prelate and historian. He was born in Edinburgh, September 18, 1643, the youngest son of Lord Crimond. At the age of 10 he entered Marischal College, Aberdeen, being admitted M.A. at the age of 14. He inclined to the study of civil and feudal law, but at his father's wish, applied himself to divinity, and at 18 was ordained. In 1663, he made a six months' stay in Oxford and Cambridge, visited London, and next year journeyed through Holland and France, in Amsterdam perfecting himself, under a learned rabbi, in the Hebrew language. In 1665 he became minister of Saltoun; in 1669, professor of divinity in Glasgow University, but resigned in 1674, having incurred the enmity of his patron Lauderdale, by mixing in the polemics of the time. He removed to London, and was made preacher of the Rolls Chapel and lecturer at Saint Clement's. In 1676 he published his *Memoirs of the Dukes of Hamilton*, and in 1679 the first volume of his *History of the Reformation*, for which he received a vote of thanks from Parliament. Next year appeared *Some Passages in the Life and Death of the Earl of Rochester*, in which Burnet records the religious interviews which led to that profligate nobleman's conversion to Christianity. In 1681 he published the second volume of his *History of the Reformation*, and in 1628 his *Life of Sir Matthew Hale*. Renewed efforts were made to induce him to break with the Liberal Party and to attach himself to the King. He was offered the Bishopric of Chichester, but refused it, and in 1683 narrowly escaped trouble in connection with the Rye House Plot. He conducted the defense, and attended the execution and vindicated the memory of his friend Lord William Russell. The King retaliated by depriving Burnet of his Saint Clement's lectureship. On the succession of James II. he went to the Continent, and traveled through France, Italy, Switzerland, and Germany. In 1684 he was introduced to the Prince of Orange, and when William went to England, accompanied him as royal chaplain, shortly after being appointed Bishop of Salisbury. He entered on his duties with ardor, but his first pastoral letter, in which he based the right of William to the throne on conquest, gave offense to Parliament, and they ordered it to be burned by the common hangman. William, who knew the excellent qualities of the Bishop, was not impressed by this solemn performance, and continued to trust Burnet to the end of his life. In 1698 Burnet was appointed preceptor of the Duke of Gloucester, and in 1699 published his exposition of the Thirty-nine Articles, which was condemned as heterodox by the House of Lords. In 1714 appeared the third volume of his *History of the Reformation*. He died of pleurisy in London, March 17, 1715. Soon after his death appeared Bishop Burnet's *History of His Own Time, from the Restoration of King Charles II. to the Conclusion of the Treaty of Peace at Utrecht, in the Reign of Queen Anne*. It was sarcastically but foolishly abused by Swift, Pope, Arbuthnot, and other Tory writers of the day. Burnet was a Broad Churchman, and was a man of almost puritanic virtue. He was distinguished by charity, geniality, and moderation. His style is neither elegant nor correct, and his judgment not always reliable; but honest simplicity and vigor, as well as fullness of detail, make his works valuable to the student of history. The best editions are the *History of His Own Time* (6 vols., Oxford, 1833); *History of the Reformation*, edited by Pocock (7 vols., Oxford, 1865). Consult "Biography of Burnet, by His Son," in the *History of His Own Time*.

BURNET, JACOB (1770-1853). An American jurist, prominent in the early history of Cincinnati, Ohio. He was born in Newark, N. J., graduated at Princeton in 1791, studied law under Judge Boudinot, and was admitted to the New Jersey bar in 1796. In the same year he removed to Cincinnati, then a straggling village, and from that time until his death was closely identified with public affairs in both city and State. He was a member of the legislative council of the territory of Ohio from 1799 to 1802, was elected to the State Assembly in 1812, was one of the supreme judges of Ohio from 1821 to 1828, and from 1828 to 1831 was a member of the United States Senate. It was largely through his influence that the people in the Middle West were relieved, in 1821, of part of their heavy debt to the national Government for public lands, and in 1830 he took an active part in securing legislation which made possible the completion of the Miami Canal. For more than 50 years he was a leader in nearly all the public enterprises undertaken in Cincinnati. He helped establish the Lancastrian Academy there; was one of the founders of Cincinnati College, of which he was also first president; was president for several years of the Ohio Medical College, and of the Cincinnati Colonization Society; and

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for some time was at the head of the Cincinnati branch of the United States Bank. He published *Notes on the Early Settlement of the Northwestern Territory* (1847), a work which contains much interesting information, and has been of value to subsequent writers on the history of the Northwest, and especially of Ohio.

BURNET, JOHN (1784-1868). A Scottish painter, engraver, and author. He was born in Edinburgh, and was apprenticed to Robert Scott, the landscape engraver. He was first brought to the notice of the public through his engravings of David Wilkie's works, which he executed in an admirable manner. Of his own paintings, the best-known engraving is that of "Greenwich Pensioners Receiving News of the Battle of Trafalgar." He wrote several works of art, illustrated by drawings and engravings of his own, the most important of which is a *Practical Treatise on Painting* (1827). He was also the author of *Rembrandt and His Works* (1849); and, in collaboration with Peter Cunningham, of *Life and Works of J. M. W. Turner* (London, 1852).

BURNET, JOHN (1863—). A Scottish scholar, born in Edinburgh. He studied at the University of Edinburgh and at Balliol College, Oxford, and in 1888 became an instructor at Harrow School. In 1890 he was appointed a fellow of Merton College, Cambridge, and in 1892 professor of Greek in Saint Andrews University. He has published scholarly works on *Early Greek Philosophy* (1892), a most excellent treatise, following in general the lines of Zeller's *Philosophie der Griechen* (1876); *Greek Rudiments* (1897); and *The Nicomachian Ethics of Aristotle* (1899). He has also edited Plato in the *Oxford Classical Texts* series.

BURNET, THOMAS (c.1635-1715). An English writer. He was born in Yorkshire, was educated at Cambridge, and in 1685 was elected Master of Charterhouse. Later he succeeded Archbishop Tillotson as chaplain in ordinary and clerk of the closet to William III. His *Telluris Theoria Sacra*, of which the first part appeared in Latin in 1681 and in English three years later, is an ingenious work, though its science was crude even for those times. In 1692 Burnet published his *Archæologiæ Philosophicæ, sive Doctrina Antiqua de Rerum Originibus* (also in English), which displayed great learning; but as it treated the Mosaic account of the fall as an allegory, and in particular burlesqued the conversation between Eve and the serpent, it gave great offense. His style, in both Latin and English, is dignified and often eloquent; but his speculations, once solemnly praised for their profundity, are now interesting only as a study in the history of philosophy, or for their colossal absurdities.

BURNET, WILLIAM (1688-1729). An American Colonial Governor, born at The Hague, Holland, the son of Bishop Gilbert Burnet. He was appointed Governor of New York and New Jersey in 1720, and immediately began to take an active interest in the competition between France and England for the control of the Indian trade. In 1722 he established, at Oswego, the first British trading post on the Great Lakes, and five years later, in spite of the vigorous protests of the French Governor of Canada, Beauharnais, and the niggardly support of the New York Assembly, built here a fort, which served to divert much of the Indian trade from the French post at Niagara, and later played a prominent part in the French and Indian wars. In 1722, also, Burnet summoned to Albany, N. Y., the Governors or representatives of several other Colonies and persuaded them to unite with him in threatening war against the Eastern Indians, in case they did not agree to a satisfactory treaty with the English. He soon aroused the opposition of the traders and many others in the Colony, however, by his rigid enforcement of an act prohibiting the sale to French traders of goods commonly used in the Indian trade. In 1728 he exchanged the Governorship of New York and New Jersey for that of Massachusetts and New Hampshire, but in this latter position almost immediately became embroiled with the Massachusetts Assembly over the old question of the payment of a fixed salary to the Governor, the Assembly stubbornly insisting on its right to raise at its own discretion all money needed for the administration of the Colony. In this matter Burnet merely acted under the explicit instructions of the home Government, the House of Commons having passed a resolution that the contention of Massachusetts tended 'to shake off the dependency of the said Colony upon their kingdom'; but the Assembly remained obdurate, and Burnet was never able to carry his point.

Though obstinate and headstrong, and frequently without tact, Burnet was an honest and capable administrator, and sincerely desired to promote the welfare of the Colonies over which he presided. He deserves especial praise for his far-sighted Indian policy in New York, which did much to further the interests of England in the long and stubborn contest with France for commercial and territorial supremacy in the Northwest.

BURNETT, FRANCES ELIZA HODGSON (1849—). A novelist who was born in England, but has been identified with American literature. She was born in Manchester, November 24, 1849, came to the United States at the close of the Civil War, and lived in Tennessee until her marriage (1873) to Dr. S. M. Burnett. She has since lived in Washington and Europe. She first gained notice by "Surly Tim's Trouble," in *Scribner's Magazine* (1872), and her reputation was firmly established by *That Lass o' Lowrie's* (1877). The most noteworthy of her later novels are *Haworth's* (1879) and *A Lady of Quality* (1896), both dealing with English life; *A Fair Barbarian* (1881); *Through One Administration* (1883); and *In Connection with the De Willoughby Claim* (1899). Her most successful book, *Little Lord Fauntleroy* (1886), is an Anglo-American story, and has been dramatized by its author. She also wrote a play, *Esmeralda* (1881), with W. H. Gillette, founded on one of her short stories; and, in collaboration with Stephen Townsend, dramatized *A Lady of Quality*. Divorced from Dr. Burnett in 1898, she afterwards married Stephen Townsend. She published in 1901 *The Making of a Marchioness*.

BURNETT, JAMES, LORD MONBODDO (1714-99). A Scottish writer and judge. He was born in Kincardineshire, and was educated at Aberdeen and Groningen. He early exposed himself to ridicule by asserting that man is but a civilized species of monkey. This theory he elaborated in his *Dissertation on Language* (6 vols., 1773-92) and in *Ancient Metaphysics* (6 vols.,

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1779-99), written respectively to show the superiority of the ancients in literature and in philosophy.

BURNETT, PETER HARDEMAN (1807-95). The first Civil Governor of California. He was born in Tennessee, but early removed to Missouri, and afterwards emigrated to Oregon, where he took a prominent part in the organization of its Territorial Government and served two terms in the Legislature. In 1848 he accompanied one of the first companies of gold-seekers to California. Here he soon attracted attention by urging the organization of a civil government for the State without awaiting Congressional authority. Immediately after the adoption of the new Constitution he was elected Governor, but resigned in 1851, and was afterwards judge of the Supreme Court (1857-58) and president of the Pacific Bank of San Francisco (1863-80). He published *The Path Which Led a Protestant Lawyer to the Catholic Church* (1860); *The American Theory of Government Considered with Reference to the Present Crisis* (1861); *Recollections of an Old Pioneer* (1878); and *Reasons Why We Should Believe in God, Love God, and Obey God* (1884).

BURNETT PRIZES, THE. Two prizes in theology founded by John Burnett of Dens, Aberdeenshire. This gentleman, who was born in Aberdeen in 1729, and died there in 1784, was a general merchant in Aberdeen, and for many years during his lifetime spent £300 annually on the poor. On his death, he bequeathed the fortune he had made to found the above prizes, as well as for the establishment of funds to relieve poor persons and pauper lunatics, for inoculation, and to support a jail chaplain, in Aberdeen. He directed the prize fund to be accumulated for 40 years at a time, and the prizes (not less than £1200 and £400) to be awarded to the authors of the two best treatises on "The evidence that there is a Being all-powerful, wise, and good, by whom everything exists; and particularly to obviate difficulties regarding the wisdom and goodness of the Deity; and this independent of written revelation, and of the revelation of the Lord Jesus; and from the whole to point out the inferences most necessary and useful to mankind." The first prize was awarded in 1815 to William Laurence Brown, and the second to John Bird Sumner, in 1848 Archbishop of Canterbury; in 1855 the first to Robert A. Thomson, and the second to John Tulloch, in 1860 principal of Saint Andrews, and the essays were published. The fund was in 1883 applied to the foundation of a lectureship on natural theology in the University of Aberdeen.

BURNETT SALMON. A local name in Queensland for the Australian lungfish (*Ceratodus Fosteri*). See BARRAMUNDA.

BUR'NEY, CHARLES (1726-1814). An English composer, well known as the author of a *General History of Music.* He was born in Shrewsbury. Having studied music in his native city, in Chester, and under Dr. Arne in London, he began to give lessons in music. After composing three pieces—*Robin Hood, Alfred,* and *Queen Mab*—for Drury Lane, Burney left London and settled as organist at Lynn, in Norfolk, where he planned his work on the *History of Music.* In 1770-72, he traveled in France, Italy, the Netherlands, and Germany, collecting materials for his projected work, and published an essay on the *Present State of Music in France and Italy,* etc. (1772); *The Present State of Music in Germany, the Netherlands and United Provinces,* etc. (1773). This was followed by his *General History of Music from the Earliest Ages to the Present Period* (4 vols., 1776-89). It has retained a good deal of its value, especially in the early parts of the work treating of the music of the ancients. Besides some minor works, Burney wrote a memoir of Handel and nearly all the musical articles in *Rees's Cyclopædia.* He was appointed organist at the hospital in Chelsea in 1789. He died in Chelsea. He was intimately acquainted with many of the most eminent men of his time, including Edmund Burke and Dr. Johnson. His second daughter was the famous writer Frances Burney (afterwards Madame D'Arblay).

BURNEY, FRANCES. See D'ARBLAY, MADAME.

BURNHAM BEECHES. The remains of an ancient forest in Buckinghamshire, England, twenty-five miles northeast of London, noted for its immense beech-trees. The poet Gray, early in the Eighteenth Century, aroused interest in this wild and picturesque tract. In 1879 the London corporation purchased the surrounding 374 acres, and in 1883 set them apart for public use. Consult Heath, *Burnham Beeches* (London, 1880).

BURN'HAM, SHERBURNE WESLEY (1838—). An American astronomer, born at Thetford, Vt., and educated at the academy there. Although a stenographer by profession, he became interested in astronomy and particularly in double stars, a field in which he soon had made many important discoveries. In 1876 he became associated with the Chicago Observatory, then with the Lick, and finally accepted the chair of practical astronomy at the University of Chicago. In 1894 he was made a fellow of the Royal Astronomical Society and was awarded a gold medal in recognition of his achievement of having recorded 1274 new double stars. His general catalogue of stars which he discovered was issued in 1900 as Vol. I. of the Publications of the Yerkes Observatory.

BURNING BUSH. See SPINDLE-TREE.

BURN'LEY (the *Brun* or *Burn* river + *leu, lea,* AS. *leah,* meadow, field). A thriving town and Parliamentary and county borough in Lancashire, England, on the Brun, and on the Leeds and Liverpool Canal, 24 miles north of Manchester (Map: England, D 3). The town was incorporated in 1861 and made a county borough in 1889. It owes its prosperity and rapid growth to the development of the textile industry. It has factories for the weaving, spinning, and printing of cotton, and for the manufacture of weaving machinery. There are slate-quarries and collieries in the vicinity. The town owns its water-works, gas-works, and electric-lighting plant, public markets, and slaughter-houses, all of which yield a substantial income. In 1887 it bought out the sewage works and added a profitable sewage plant in 1889. The city provides public baths, a municipal technical school, a sanatorium, and a Victoria Hospital. The population has risen from 29,000 in 1861, to 87,000 in 1891, and 97,000 in 1901.

BURNOOSE, bûr-nōōs', or **BURNOUS** (Ar. *burnus, burnūs,* a hooded cloak, whence Fr.

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burnous, Ger. *Burnus*, Russ. *burnusŭ*, *burnuzŭ*). The name of a garment worn in parts of North Africa. It is a large woolen mantle, worn above the other attire of the natives, and having a hood, which is thrown over the head in rainy weather. The burnoose is generally white, though distinguished individuals wear it of various colors. It has been long in use among the Spaniards under the name of *albornoz*. Through the conquest of Algeria by the French, the burnoose was imported into France and England, although its original form has been considerably altered.

BURNOUF, bur'nōōf', EMILE LOUIS (1821—). A French Orientalist, cousin of Eugène Burnouf. He was born in Valognes, France, August 25, 1821; lectured for a time in Nancy, on ancient literature, and subsequently was director of the French school in Athens. Among his works are *Méthode pour étudier la langue sanscrite* (3d ed., 1885); *Essai sur le Véda* (1863); *Dictionnaire classique sanscrit-français* (1863-65); *Histoire de la littérature grecque* (1869); *La ville et l'Acropole d'Athènes aux diverses époques* (1877); *La mythologie des Japonais* (1878); and *Le catholicisme contemporaine* (1879).

BURNOUF, EUGÈNE (1801-52). A French Orientalist, one of the most distinguished of modern times. He was born in Paris, August 12, 1801, and after entering on the study of law, devoted himself to the Oriental languages, especially those of India and Persia. In conjunction with Professor Lassen of Bonn, he published, in 1826, *Essai sur le Pali*, which was followed, in 1827, by *Observations grammaticales sur quelques passages de l'essai sur le Pali*. His great aim, however, at this time, was to obtain a complete knowledge of the remains of the language and religious literature of the Avesta (q.v.), which had been neglected since the time of Anquetil du Perron, or, at least, not philologically and critically examined. Burnouf undertook to decipher those curious MSS. which Anquetil du Perron had brought home with him, and which lay unregarded in the Bibliothèque Impériale. He commenced by causing the *Vendidad-Sadé* to be lithographed with great care and published from time to time in the *Journal Asiatique*. In 1832 he became a member of the Academy of Inscriptions, and in the same year succeeded Chézy as professor of Sanskrit in the Collège de France. In 1834 he published the first volume of his *Commentaires sur le Yaçna, l'un des livres liturgiques des Parses*, a work which, for the first time, rendered possible a knowledge not only of the dogmas, but also of the language of Zoroaster. It is a masterpiece of conscientious industry and scholarly acumen for the time, but too comprehensive in its scope to allow the work ever to be completed. His studies in the Avestan language induced him to make an attempt to decipher the cuneiform inscriptions of Persepolis, in his *Mémoire sur deux inscriptions cunéiformes* (Paris, 1836). In 1840 he published the text along with a translation of the *Bhagavat-Purana*, a system of Indian mythology and tradition. As the fruit of his study of the Sanskrit books of the Buddhists, he published in 1845 the *Introduction à l'histoire du Bouddhisme indien*. (See BUDDHISM.) This great work absorbed for six years the whole energies of Burnouf, who was now the recognized successor of Silvestre de Sacy. He died May 28, 1852.

BURNOUF, JEAN LOUIS (1775-1844). A French philologist, born at Urville (Manche). In 1807 he became an assistant professor at the Collège Charlemagne, and in 1816 professor of eloquence. From 1840 he was librarian of the university. He did much to promote the interests of classical studies in France, in particular through such works as his *Méthode pour étudier la langue grecque* (1814; last ed. 1893). He also prepared an excellent translation of Tacitus (6 vols., last ed. 1881).

BURNS, ANTHONY (c.1830-62). A celebrated fugitive slave. He escaped from slavery late in 1853, but was arrested in Boston on May 24, 1854, under the provisions of the Fugitive Slave Law of 1850, and, pending a trial, was confined in the Boston Court House. News of his arrest spread rapidly and the people of Boston, already indignant over the passage of the Kansas-Nebraska Bill (q.v.), were quickly aroused to a high pitch of excitement. On the evening of the 26th a great crowd met in mass meeting at Faneuil Hall and listened to fiery addresses by Wendell Phillips and Theodore Parker, but soon adjourned, amid scenes of great excitement, to help forward a premature effort at rescue then being made by a small party under Thomas W. Higginson (q.v.). The attempt completely failed, however, after one of the marshal's posse had been killed and a number of the rescuing party had been more or less severely injured, and on June 2 Burns was formally adjudged to his owner by the United States Commissioner. Under the escort of a strong guard, he was taken through the streets and placed on board a United States revenue cutter, the houses along the line of march being draped in deep mourning and flags being everywhere placed at half-mast. Burns's freedom was procured in the following year with money collected by a colored preacher of Boston. He subsequently studied at Oberlin, and for several years was pastor of a church in Saint Catharines, Canada. He was 'the last fugitive slave ever seized on the soil of Massachusetts.' Consult: C. E. Stevens, *Anthony Burns: A History* (Boston, 1856), and interesting accounts in T. W. Higginson, *Cheerful Yesterdays* (Boston, 1898), and C. F. Adams, Jr., *Richard Henry Dana, A Biography* (Boston, 1891).

BURNS, JOHN (1858—). An English labor leader, born in Vauxhall, London. From 1868 he was apprenticed to various trades, finally to engineering at Millbank, and for a year was a foreman engineer in West Africa. By his platform oratory, he became prominent as a representative of working men, and as an official of the Amalgamated Engineers' Association was also well known. He defended the right of public meeting in Trafalgar Square in 1887, and was imprisoned for six weeks for resisting the police. In 1885 he was defeated as Socialist candidate for Parliament from West Nottingham, and in 1889 was a member of the committee which effected a settlement in the great London dock strikes of that year. He was a member of the London county council, and was in 1892 returned to Parliament for Battersea. He has published pamphlets and speeches.

BURNS, ROBERT (1759-96). The great lyric poet of Scotland. He was born at Alloway, in Ayrshire, January 25, 1759. His father, then a

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nursery gardener, and afterwards the occupant of a small farm, had to struggle all his life with poverty and misfortune, but made every exertion to give his children a good education; and the boy was able to enjoy a considerable amount of instruction and miscellaneous reading in spite of his poverty. Among the books placed in his way were the *Spectator*, Locke's *Essay*, and Pope's *Iliad*. He learned French and some Latin; and he knew Allan Ramsay and the popular songs of Scotland. In his seventeenth year he wrote his first poem, adressed to Nelly Kilpatrick, by whose side he had worked in the fields. In 1777 he was sent to study surveying in the house of his uncle, Samuel Brown, at Ballochneil. Here he fell into the company of some 'jovial smugglers,' and began to realize the force of the traditional association of wine, woman, and song. His father was now trying another farm at Lochlea, near Tarbolton, to which the young poet returned, probably feeling himself not a little of a man of the world. In 1780 he was one of the founders of a 'Bachelor's Club' at Tarbolton, at whose meetings such weighty topics as the relative merits of love and friendship were gravely discussed. The love affairs which have provoked so much ethical controversy continually beset him. The generally lax morality of the Scotch peasantry at the period may partly account for, if not excuse, his failings in this direction. He was for a while seriously smitten by the charms of a farmer's daughter named Ellison Begbie, who is supposed to be the original of his Mary Morison; but she prudently declined an alliance, and in the summer of 1781 he went to Irvine to join a relative of his mother's in a flax-dressing business; but a convivial celebration of the next new year's advent ended in the burning down of the shop. Returning to Lochlea, he lived quietly and temperately after this reverse; and after his father's death, in 1784, he and his brother Gilbert settled on a small farm, which they had taken in the previous autumn at Mossgiel, near Mauchline. Here he became acquainted with several educated men and wrote some of his finest poems, such as "The Jolly Beggars," "The Cottar's Saturday Night," and the lines "To a Mouse." He had already begun to think of publication, his brother having assured him that his "Epistle to Davie" would 'bear being printed,' when the perplexing consequences of his love affair with Jean Armour (to whom he had given, under pressure, a written certificate that she was his wife, but who had been induced to repudiate him) determined him to emigrate. He accordingly published a volume of poems in July, 1786, with a view to making his passage-money to Jamaica. Meantime, from May to October of the same year (while still able to protest on June 6 that he loved Jean to distraction), he developed a passionate attachment to Mary Campbell, who died of a fever, and was commemorated by some of his most pathetic poems, "To Mary in Heaven" and "Highland Mary." The success of his little volume and negotiations for a second edition decided him to stay in Scotland, and finally in November drew him to Edinburgh. Here he was received with enthusiasm in good society, and made a favorable impression by the 'dignified plainness and simplicity' of which Scott, who then saw him, speaks. From the second edition of his poems (April, 1787) he received in the end about £500. While waiting for payment he traveled agreeably in various company, and renewed his old relations with Jean Armour, to whom he was legally married in August, 1788. Before this, in March, he had been appointed to a place in the excise, and had taken the lease of a farm at Ellisland, near Dumfries. The farm not paying too well, Burns took up his duties as excise-man, and discharged them vigorously, though not with excessive sternness. Here he wrote "Tam o' Shanter" in a single day for Grose, the antiquarian, in whose *Antiquities of Scotland* (1791) it was first published. In December, 1791, having given up his farm, he settled in Dumfries on a salary of £70 a year. Some unguarded political expressions drew upon him the suspicion of the Government, and he came near losing his post. Possibly embittered by what he felt to be injustice, he allowed his habits of dissipation to grow on him, to the detriment of both his reputation and his health. All the while, however, his poetical activity continued, though he indignantly refused offers of a regular salary for contributions to the London *Star* and *Morning Chronicle*. Broken in health and spirits, he died July 21, 1796.

Burns was of about the average height and of heavy build, with features inclined to coarseness. According to Scott, the portraits (of which the most trustworthy is that by Nasmyth, 1787) have unduly refined them. His face became singularly animated and expressive in conversation, and numerous observers have commented on the extraordinary glow of his fine eyes. "I never saw such another eye," says Scott, "in any human head." His character has perhaps been sufficiently indicated above; but if regrettably weak in certain directions, it had very respectable elements—an honorable pride, a sense of duty toward his relatives, and a real desire to act a manly and not a heartless part. His poetry was nearly always written on the spur of the moment—the response of the feelings to the immediate circumstances. Its charm and power lie in the justness of the feelings expressed, and in the truthfulness and freshness which it derives direct from life. Seldom have such manliness, tenderness, and passion been united as in the songs of Burns. He is weak only when, acting on bad advice, like David in Saul's armor, he tries to write in the conventional English instead of the simple, natural Scottish dialect. He had no slight influence in preparing the way for that outburst of the natural in English poetry, whose epoch-making date, the publication of the *Lyrical Ballads*, falls only two years after his death. The hundredth anniversaries of his birth and death were celebrated with immense enthusiasm, not only in Scotland, but throughout the English-speaking world.

For editions of Burns consult: Chambers, with Life and Letters, revised by Wallace (4 vols., Edinburgh, 1896); Douglas, with Life and estimate by Nichol (7 vols., Edinburgh, 1896); Henley and Henderson, centenary edition (4 vols., Edinburgh, 1896-97); and for his life, Lockhart (latest edition, Edinburgh, 1890); Shairp, in *English Men of Letters* series (London, 1879); Angellier, *Robert Burns, sa vie et ses œuvres* (Paris, 1893); and Higgins (London,

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1893). Consult also: Wallace (editor), *Correspondence Between Burns and Mrs. Dunlop* (London, 1898); Carlyle, *Essays* (London, 1847); Stevenson, "Robert Burns," in *Familiar Studies of Men and Books* (London, 1882); McKie, *Bibliography of Burns* (Kilmarnock, 1881).

BURNS, William Chalmers (1815-68). A Scottish Protestant missionary to China. He was born at Dun, Forfarshire, April 1, 1815; was educated in Aberdeen; practiced law; then became a minister in 1839. He carried on extensive revivals in Great Britain, Ireland, and Canada, but in 1847 went out as a Presbyterian missionary to China. He adopted Chinese dress and lived like a native. He had much facility in acquiring the spoken language, and labored with great enthusiasm in many places. In this way he became widely known. Everywhere he commended himself by his faith, piety, courage, and unselfishness, and is still held in loving remembrance. He died at Nieu-chwang, April 4, 1868. Consult Burns, *Memoir of William Chalmers Burns* (New York, 1870).

BURNS, William Wallace (1825-92). An American soldier. He was born in Coshocton, Ohio, and in 1847 graduated at West Point. He served in the war with Mexico, and was in the field with the Army of the Potomac from 1861 to 1863, during which time he attained the rank of major-general of volunteers. Later he became chief commissary of the Department of the Northwest, and during the last part of the war was chief commissary of the Department of the South. He received the brevet of brigadier-general in 1865, and was on duty in the Commissary Department at Washington until 1889, when he retired, with the regular rank of colonel.

BURNS AND SCALDS. A burn is an injury to the body produced by heat or corrosive substances. A scald is an injury produced by a heated liquid or vapor. Practically three degrees of burns are recognized by surgeons: (1) Burns resulting in a simple reddening of the skin. (2) Burns characterized by the formation of vesicles or blebs. (3) Burns resulting in sloughing and the formation of a scar, including all gradations of severity, from partial destruction of the true skin to incineration of skin, muscle, and bone. Symptoms: Pain and shock, to be relieved by opiates and stimulants. If the denuded surface be large the patient may suffer from cold, in addition, to be combated with voluminous dressings and artificial heat from bottles and hot enemata. Cleanliness and exclusion of air are sought in local dressings, to lessen suppuration, and the object of later treatment is promotion of the growth of skin. Vaseline or preparations of boric acid are useful. Contracting scars often result, causing deformity. To obviate this result, skin-grafting and splints so adjusted as to secure surface extension are employed. Later plastic operations may relieve deformities. (See Autoplasty.) The extent of surface affected determines in part the danger of a burn. Death may follow injury to a third of the surface of the body; it is quite certain to follow injury to one-half the surface. Children bear burns very badly, and burns about their faces or necks are more dangerous than those of similar extent in other regions.

BURN'SIDE, Ambrose Everett (1824-81). An eminent American soldier, prominent on the Federal side during the Civil War. He was born in Liberty, Ind.; attended a village school, and at seventeen was indentured to a merchant tailor; but soon afterwards was appointed to the United States Military Academy, where he graduated in 1847. He then spent some years in garrison duty, but later resigned from the service, and from 1853 until 1858 was a manufacturer of firearms at Bristol, R. I., inventing the Burnside breech-loading rifle in 1856. On the outbreak of the Civil War he entered the Federal Army, and from May to August, 1861, was colonel of Rhode Island volunteers, participating as such in the first battle of Bull Run. He became brigadier-general of volunteers on August 6, was engaged in organizing the 'Coast Division' of the Army of the Potomac from October, 1861, to January, 1862, and commanded the Department of North Carolina from January to July of this year, during which time he captured Roanoke Island, occupied Newbern, N. C., and forced the surrender of Fort Macon, Beaufort. On March 18, 1862, he was raised to the rank of major-general of volunteers. He was then placed in command of the reënforcements intended for the Army of the Potomac, which later constituted the Ninth Army Corps, and in July was offered, but emphatically refused, the chief command of the Army of Virginia. After the second battle of Bull Run he was again offered the chief command, the Army of Virginia now being merged into the Army of the Potomac; but he again declined it, and served under McClellan as commander of the Ninth Corps in the Maryland campaign against Lee, participating in the battle of South Mountain, and commanding the left wing in the battle of Antietam on September 17. (See Antietam, Battle of.) Though still feeling that he was unqualified for the position, he was finally—on November 10—placed in command of the Army of the Potomac, and conducted the campaign against Lee, which virtually ended with the overwhelming defeat of the Federals at Fredericksburg, on December 13. Burnside attacked on this occasion with foolhardy recklessness, and, in general, proved unequal to the task assigned to him. (See Fredericksburg, Battle of.) On January 26, 1863, he was replaced by Hooker, and from March to December he was in command of the Department of the Ohio, during which time he captured Cumberland Gap, marched into East Tennessee, and occupied Knoxville, where for some time he was besieged by the Confederate General Longstreet. On April 13 he issued his famous "General Order No. 38," directed against the 'Copperheads' in his department, and especially against Vallandigham, who was soon afterwards arrested, convicted, and imprisoned. (See Vallandigham, Clement L.) This order, together with his "General Order No. 84," which prohibited the circulation of the New York *World* and suppressed the Chicago *Times*, aroused the most violent opposition as striking at the freedom of speech and of the press, and President Lincoln yielded to the popular demand so far as to rescind that part of the latter order which suppressed the *Times*. From May to August, 1864, Burnside served under Grant, as commander of the Ninth Corps in the Richmond Cam-

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paign, taking part in all the important battles during that time, and having charge of the mine operations at Petersburg. For his conduct on this latter occasion, he was subsequently censured by a court of inquiry which, after a prolonged investigation, found him, along with several other officers, 'answerable for the want of success.' Many military critics, however, have since contended that Burnside was not really at fault, and that the responsibility for the fiasco should be placed elsewhere. On April 15, 1865, Burnside resigned from the service, and subsequently was prominent as a projector and manager of railroads. He was Governor of Rhode Island from 1866 to 1869, and from 1875 until his death was a member of the United States Senate. In 1870 he visited Europe, and during the siege of Paris acted as a medium of communication between the French and Germans. As a soldier he rendered valuable services in the capacity of corps commander, but proved unable to cope with the problems and difficulties which fall to the lot of a commanding general. Consult: Poore, *Life and Public Services of Ambrose E. Burnside* (Providence, 1882), and Woodbury, *Major-General Burnside and the Ninth Army Corps* (Providence, 1867).

BURNTISLAND, bûrnt'ĭland. A seaport of Fifeshire, Scotland, on the north shore of the Firth of Forth, about eight miles north-northwest of Edinburgh (Map: Scotland, E 3). Its streets are clean and well kept. Burntisland is an important station of the North British Railway, having a steamboat ferry connecting it with Granton, the station on the opposite side of the Forth. It has a commodious harbor, which was greatly improved in 1876. Its industries consist principally of distilling, oil-refining, and the shipping of coal and iron. In summer it is much frequented as a watering-place. Together with Kinghorn, Dysart, and Kirkcaldy it sends one member to Parliament. Population, in 1891, 4692; in 1901, 4726.

BURNT SIENNA, sĭ-ĕn'nȧ. A fine orange-red pigment, transparent and permanent, used in both oil and water-color painting. It is obtained by simply burning the ferruginous ochreous earth known as Terra di Sienna. Excellent greens are produced by mixing it with Prussian blue. It mixes well with other pigments generally, dries quickly, and is most valuable in warming and enriching shadows.

BURNT STONES. A variety of carnelian usually found in ruins. They have a dull appearance externally, but exhibit a beautiful red color when held up to the light. This peculiar effect is supposed to have been produced by fire, and has been imitated by burning the upper surface of the gem with a hot iron. They were formerly highly prized, especially if handsomely cut.

BURNT UMBER. A pigment of a russet-brown color. It is semi-transparent, mixes well with most other pigments, and dries quickly. It is obtained by burning umber, an ochreous earth containing manganese, and deriving its name from the place where it was first discovered—Umbria, in Italy.

BUR-OAK. See OAK.

BURR, AARON (1716-57). An American clergyman and educator. He was born in Fairfield, Conn., and graduated at Yale in 1736. Two years later he became pastor of the Presbyterian church in Newark, N. J., and in 1748 second president of the College of New Jersey, now Princeton University. As his predecessor, Jonathan Dickinson, was president only a few months, Dr. Burr, in his administration of nine years really laid the foundations of the college. He was a thorough scholar and an eloquent preacher. His wife was the daughter of Jonathan Edwards. He was the father of Aaron Burr (1756-1836). Dr. Burr published a Latin grammar known as *The Newark Grammar* (1752); *The Supreme Divinity of Our Lord Jesus Christ* (new ed. 1791), and several sermons.

BURR, AARON (1756-1836). An American politician, Vice-President of the United States from 1801 to 1805. He was born in Newark, N. J., February 6, 1756, and was the son of the Rev. Aaron Burr, D.D., second president of Princeton College, and the grandson of Jonathan Edwards (q.v.), the famous theologian. His paternal grandfather, according to Hildreth, was a German who had settled originally at Fairfield, Conn. His father died in 1757 and his mother in the following year, and he, with his sister, was brought up by his maternal uncle, the Rev. Timothy Edwards, at Elizabethtown, N. J. He graduated at Princeton in 1772, studied theology under the Rev. Dr. Bellamy, of Bethlehem, Conn., and then (1774) studied law with Tappan Reeve, his brother-in-law, in Litchfield, Conn. He entered the Continental Army in 1775, soon after the battle of Bunker Hill; took part in Benedict Arnold's Canadian expedition; became in turn a member of Washington's military family (April, 1776), and an aide to General Putnam (June, 1776); served with distinction as lieutenant-colonel at Hackensack and Monmouth (q.v.), where he commanded a brigade; was placed in command of the American lines in Westchester County (N. Y.)—in the so-called Neutral Ground—in January, 1779; and in March of this year resigned from the service. He was involved in the opposition to Washington, and at the time of the more serious friction sided with Lee and Gates. (See CONWAY CABAL, THE.) In 1782 he began the practice of the law in Albany, N. Y. In July of the same year he married Mrs. Theodosia Prevost, the widow of a British officer who had died in the West Indies, and in the following year their only child, Theodosia, was born in New York. (See BURR, THEODOSIA.) In 1833 Burr, then in his seventy-eighth year, married Madame Jumel, the widow of a French merchant, who had an estate in the northern part of Manhattan Island, and who possessed some property. Much of the property was soon spent by Burr, and the couple separated, but were never divorced.

Burr definitely established his home in the city of New York, in December, 1783, soon after his first marriage, and his political activity and advancement there soon became marked. He was a member of the State Assembly in 1784-85, and again in 1797-99; was Attorney-General of the State in 1789; was a member of the United States Senate from 1791 to 1797; and in 1801, just before becoming Vice-President, was chairman of the Constitutional Convention of New York. In 1792 he declined a nomination to the Supreme Court of New York. He was an early, zealous, and unscrupulous leader among the Republicans (afterwards Democrats), and the especial rival of Alexander Hamilton, the

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prominent leader of the Federalists. In the Presidential struggle of 1800, John Adams (then President), Thomas Jefferson, Charles C. Pinckney, and Burr were the candidates, and the votes for Jefferson and Burr, the two Republican candidates, were equal—73 for each. As the Constitution then provided, the person having the largest number of electoral votes was to be President, and the person having the next largest number was to be Vice-President. The equal division threw the election into the House of Representatives, where each State had one vote only, the vote of a majority of all the States being necessary for a choice. After a week of balloting Jefferson was chosen President, and Burr therefore became Vice-President. He was charged, unjustly it seems, with having exerted himself to defeat Jefferson, who was the regular Presidential candidate of his party, and his alleged intrigues to this end ruined him politically as a Republican. In 1804, however, he ran as an independent candidate for governor of New York and received the support of some of the Federalists, but was defeated by Morgan Lewis. For this Burr blamed Hamilton, who had undoubtedly used all of his influence against him, both on this occasion and in 1801, and these disappointments and failures, added to the intensely bitter character of the partisan warfare of the time, led to a duel, at Weehawken, N. J., on July 11, 1804, in which Hamilton, who discharged his weapon into the air, was killed by Burr. In the spring of 1805 Burr started for the western part of the country, bent upon the conquest of Mexico and the establishment there of a separate government, with himself as chief. It was in the course of these operations that he brought ruin upon his friend Harman Blennerhassett (q.v.). In 1806 President Jefferson was informed, in part, of Burr's schemes by General Wilkinson, in whom Burr had partially confided, and Burr was soon arrested at Frankfort, Ky. He was defended by Henry Clay, and was acquitted after an exciting trial. He was again arrested at Natchez in January, 1807, but was released by the Grand Jury, and on February 19, in Alabama, he was a third time arrested. After a long and memorable trial at Richmond, Va., first on a charge of treason and then on a charge of misdemeanor, he was again acquitted, and in June, 1808, sailed for Europe to raise means for prosecuting his schemes. Four years of effort in England, Sweden, Germany, and France resulted in nothing but failure, and in 1812 he returned in extreme poverty, and opened a law office in New York; but his course had alienated the people, and he met with only moderate success.

Henry Adams, after showing how Burr had "endeavored by the foul means of a Federal alliance to acquire the Presidency," goes on to say, with a vehemence which is really partisan, that "a more gross betrayal of confidence could hardly be conceived, even in political life. He had made it clear that his heart was set upon personal aggrandizement, and not upon a Republican success. His untrustworthiness appeared the more despicable by comparison with the strictly honorable conduct of Jefferson, who might have excused endeavors on his own behalf upon the plausible ground that he was only forwarding the avowed will of the party. The antipathy with which many persons had long since learned to regard Burr now became the sentiment of all honest and intelligent men in the nation." Schouler, after referring to the brilliant and captivating manners of Burr, describes him as "one whose restless and romantic ambition was the more dangerous because of his utter want of conscience and generosity. He was socially well connected, and had, like Hamilton, won a fair military reputation in the war for a young officer, gaining on its close later distinction as an advocate at the New York bar, where these two were professional competitors under an act which disqualified all Tory practitioners." Hildreth designates Burr as "artful, affable, and fascinating," and he thus sums up the closing years of his life: "Arriving in New York, he found himself, in his old age, and still harassed by his creditors, obliged to resume the practice of the law for support. The death of his only daughter, lost at sea on a voyage from Charleston to meet him, left him without family ties. Yet, amid all this loneliness and embarrassment, his remarkable equanimity did not desert him, and he lived twenty-four years longer, shrouding himself with that mystery and obscurity which he so much affected, and dying at last (1836) after surviving almost all his contemporaries, at the age of eighty—a remarkable example of the mutability of political fortune." His death occurred, September 14, 1836, at Port Richmond, on Staten Island, N. Y., and his body was placed with his father's in the burying-ground at Princeton. Consult: Parton, *Life of Aaron Burr* (New York, 1858); Davis, *Memoirs of Aaron Burr* (2 vols., New York, 1836); the interesting *Private Journals of Aaron Burr during his Residence in Europe* (2 vols., New York, 1838), edited by Davis; and the brief sketch by Merwin, *Aaron Burr* (Boston, 1899), one of the "Beacon Biographies;" Adams, *History of the United States* (9 vols., New York, 1889-91), has much useful material; also Schouler, *History of the United States of America Under the Constitution* (6 vols., last edition, New York, 1899). For a strongly favorable view of Burr's life and character, consult Todd, *The True Aaron Burr* (New York, 1902), and for a bibliography virtually complete to date of publication, consult Tompkins, *Burr Bibliography* (Brooklyn, 1892).

BURR, ENOCH FITCH, D.D., LL.D. (1818—). An American Congregational divine. He was born at Westport, Conn., October 21, 1818; graduated at Yale College, 1839, and became pastor at Lyme, Conn., 1850. He lectures on the scientific evidences of religion. Of his numerous publications, all of which sold widely, may be mentioned *Ecce Cœlum* (1867); *Pater Mundi* (1869); *Ad Fidem* (1871); *Ecce Terra* (1884); *Celestial Empires* (1885); *Universal Beliefs* (1887); *Long Ago as Interpreted by the Nineteenth Century* (1888); *Supreme Things in their Practical Relations* (1889); besides several historical stories, e.g. *Aleph* (n.e., 1902) and *Fabius* (1897).

BURR, GEORGE LINCOLN (1857—). An American historian. He was born at Oramel, N. Y.; graduated in 1881 at Cornell, and studied at Leipzig, the Sorbonne, the Ecole des Chartes, and Zürich, in 1884-86 and 1887-88. In 1888 he was appointed professor of ancient and mediæval history at Cornell. He was historical expert for the Venezuelan boundary com-

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mission in 1896-97. He is known chiefly as a student of the history of superstition. His works include *The Literature of Witchcraft* (1890) and *The Fate of Dietrich Flade* (1891).

BURR, THEODOSIA (1783-1813). The daughter of Aaron Burr, famous for her beauty, her accomplishments, and for her devotion to her father. She was born in New York City; was carefully educated by her father, showing considerable precocity, especially in linguistic studies; and after her mother's death in 1794 until 1801, was mistress of her father's household. In 1801 she married Joseph Alston, a wealthy South Carolina planter, who subsequently was elected to the Governorship of the State. She did much to arouse a feeling of sympathy for her father at the time of his trial for treason as well as thereafter. In 1812 she started from Charleston in the pilot-boat *Patriot* for New York, but the vessel was caught in a storm and was probably wrecked off Cape Hatteras, though its fate was never definitely ascertained. A tradition of uncertain origin makes the *Patriot* to have been taken by pirates and all those on board put to death.

BURR, WILLIAM HUBERT (1851—). An American civil engineer, born at Watertown, Conn. He received his education and professional training at the Rensselaer Polytechnic Institute and, after several years' engineering practice, was appointed professor of mechanics at the Institute. In 1884 he resigned the professorship to become assistant engineer to the Phœnix Bridge Company; subsequently he was appointed general manager to this company, and in 1891 was made vice-president of a company of contracting engineers. In the following year he accepted the professorship of engineering at Harvard, and early in 1893 a similar position at Columbia University, in New York. The duties of his chair, however, did not prevent him from continuing his practice of engineering, and he repeatedly rendered important services to the city of New York, as well as to the national Government. After 1893 he acted as consulting engineer to several city departments of New York, and in 1900 was awarded the first place in the competition for the proposed Memorial Bridge across the Potomac. His published works include the following: *Stresses in Bridge and Roof Trusses, Arched Ribs, and Suspension Bridges* (1879); *The Theory of the Masonry Arch* (1881); and *The Elasticity and Resistance of the Materials of Engineering* (1883).

BUR'RAGE, HENRY SWEETSER (1837—). An American Baptist minister and author. He was born at Fitchburg, Mass., and was educated at Brown University, Newton Theological Institution, and at the University of Halle, Germany. He served in the Thirty-sixth Massachusetts Volunteers from 1862 to 1865, and was brevetted major at the close of the war. In 1873 he became editor of *Zion's Advocate*. Besides several reviews and historical papers and his edition of the works, *Brown University in the Civil War* (1868), and *Rosier's Relation of Waymouth's Voyage* (1887), his publications include *The Act of Baptism in the History of the Christian Church* (1879); *History of the Anabaptists in Switzerland* (1883); *Baptist Hymn-Writers and Their Hymns* (1888); *History of the Baptists in New England* (1894).

BUR'RARD IN'LET. An arm of the Gulf of Georgia in southwest British Columbia. It is nine miles long; its shores, backed by the snow-capped Cascade and Olympic mountains, and covered with forests of cedars, spruces, firs, and pines, abounding in game, are a favorite resort of sportsmen. The waters of the inlet abound in unique specimens of marine biology and also afford good fishing and bathing. Vancouver, the western terminus of the Canadian Pacific Railway, is situated on its north shore.

BUR'RELL, DAVID JAMES (1849—). An American clergyman and author. He was born at Mount Pleasant, Pa., and graduated at Yale in 1867, and the Union Theological Seminary in 1870. After being engaged in mission work at Chicago for four years, he successively held pastorates in the Second Presbyterian Church, Dubuque, Ia. (1876-77); Westminster Church, Minneapolis (1887-91); and the Marble Collegiate Church, New York (founded in 1628, and the oldest church on the continent). The following are a few of his most important works: *The Religions of the World; Hints and Helps* (3 vols. on Bible studies); *The Gospel of Gladness; The Early Church; The Religion of the Future.*

BURRIANA, bōōr'rē-ä'nä. A town of Spain, in the Province of Castellón, about 8 miles south of the town of that name, situated in a fertile plateau on the left bank of the Rio Seco, about 1 mile from its mouth in the Mediterranean (Map: Spain, E 2). Its inhabitants are chiefly engaged in agriculture and fishing, though a considerable trade in wine, oil, and fruit is carried on. Population, in 1897, 11,700.

BUR'RILLVILLE. A town in Providence County, R. I., 23 miles northwest of Providence on the New York, New Haven and Hartford Railroad. It is noted principally for manufactures of woolen goods. Wallum Lake, a summer resort, popular for its fishing and fine scenery, is a noteworthy attraction of the town. The government is administered by a town council, annually elected. Population, in 1890, 5492; in 1900, 6317.

BUR'RITT, ELIHU (1811-79). An American philanthropist and linguist. He was born at New Britain, Conn., and first followed the occupation of blacksmith, which fact, together with his extraordinary aptitude for languages and his marvelously rapid mastery of them, gained for him the title of the 'Learned Blacksmith.' During a visit abroad in 1846-47 he was greatly touched by the suffering of the Irish peasantry in the awful famine of that year. His diary of a tour through Ireland, at this time, for the purpose of relieving the destitution and misery, is one of the most graphic and touching descriptions of human suffering ever published. In 1848 he organized the first international congress of Friends of Peace, which convened in Brussels in September of that year, and which was followed in 1849 by a second 'Peace Congress' in Paris, presided over by Victor Hugo. Burritt next lectured throughout the Union, and then returned to Europe to attend the peace congresses in Frankfort-on-the-Main (1850), London (1851), Manchester (1852), and Edinburgh (1853). His conceptions of universal brotherhood and international arbitration received a rude shock upon the outbreak of the Crimean

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and Civil wars. It has been claimed that his efforts in behalf of universal peace led to such results as the Geneva tribunal, the Washington treaty, the Paris Bering Sea tribunal, and the representations of the United States and the other Powers to Turkey regarding the troubles in Armenia. For his biography, consult Northend (New York, 1879).

BURRO, bu̇r'rō (Sp.). The small donkey widely used as a pack-animal in Mexico and the southwestern United States. A company of them is called a burro-train.

BURROUGHS, bŭr'rōz, GEORGE (c.1650-92). A Colonial clergyman in America, the most prominent victim of the Salem witchcraft delusion of 1692. He graduated at Harvard in 1670, subsequently preached for several years at Falmouth (now Portland, Maine), and from 1680 to 1683 was pastor of the church at Salem Village (now Danvers), Mass. In 1685 he returned to Falmouth, but afterwards removed to Wells, where he was living at the time of the witchcraft delusion of 1692. Owing probably to the personal hostility of some of his former parishioners at Danvers, he was arrested early in 1692 on a charge of witchcraft, his indictment asserting that he, on May 9 "as well before, as after, Certaine Detestable Arts called Witchcrafts and Sorceries, Wickedly and ffelloniously hath Vsed, Practised, & Exercised . . . in, Vpon, & agt one Mary Walcott of Salem village by which said wicked Arts the said Mary . . . was and is Tortured, afflicted, Pined, Consumed, Wasted, and Tormented against the Peace of our Sovereigne Lord & Lady, the King and Queen." Burroughs was also charged with having likewise bewitched three other girls, and at the trial "was accused by five or six of the Bewitched as the Author of their Miseries; . . . by eight of the Confessing Witches as being an head Actor at some of Their Rendezvouses, and one who had the promise of being a King in Satan's Kingdom, now going to be Erected; by Nine Persons for extraordinary Lifting and such feats of strength, as could not be done without Diabolicall Assistance." He was finally convicted on each indictment, in spite of the report of a jury, ordered to search his body for witch marks, that "Wee find nothing upon ye body of ye Sayd burroughs but wt is naturall;" and on August 19 he was executed on Gallows Hill, Salem, making a speech on the scaffold which moved the spectators to tears and called from Cotton Mather, alarmed lest the proceedings be discontinued, the assurance that "the Devil has often been transformed into an Angel of Light." Burroughs was the only minister who lost his life during the witchcraft delusion. Consult Sprague, *Annals of the American Pulpit*, Vol. I. (New York, 1857-69); Sibley, *Graduates of Harvard University*, Vol. II. (Cambridge, 1873-85), and Upham, *Lectures on Salem Witchcraft* (Boston, 1867).

BURROUGHS, JOHN (1837—). An American essayist and critic. He was born at Roxbury, N. Y., April 3, 1837, the son of a farmer. He spent his youth between study and work in the field, and has said that his originality was fostered by growing up among people who neither read books nor cared for them. He was, however, a born author, and at fourteen began to write essays, which have remained always his favorite form of expression. His first efforts were labored imitations of the ponderous lucubrations of Johnson; one of the first luxuries that he permitted himself having been the purchase of that author's works. A more congenial inspiration soon came to him from Emerson, whose *Essays* and *Miscellanies* he assimilated eagerly, and at nineteen he succeeded in gaining admission to *The Atlantic Monthly* with an essay on *Expressions*. After Emerson, to whom Burroughs ascribes the awakening of his religious nature and a revolution in his literary expression, the great influences in his literary life were two: Walt Whitman, who was to him a great humanizing power, and Matthew Arnold, from whom he gained clarity, alike in thought and expression. All these influences came to him in their fullness before the publication of his first book, *Walt Whitman as Poet and Person* (1867). Meantime, he had been engaged as teacher, as journalist, and as an official of the Treasury Department at Washington (1863-73). He was for some years afterwards special national bank examiner, but from 1870-74 passed most of his time on a farm in Esopus, N. Y., where he divided his time between fruit-culture and literature. Besides frequent contributions to periodicals, chiefly studies of nature and animal life, he wrote *Wake Robin* (1871); *Winter Sunshine* (1875); *Birds and Poets* (1877); *Locusts and Wild Honey* (1879); *Pepacton* (1881); *Fresh Fields* (1884); *Signs and Seasons* (1886); *Sharp Eyes* (1888); *Indoor Studies* (1889); *Riverby* (1894); *A Study* (1897); *The Light of Day* (1900); *Squirrels and Other Fur-Bearers* (1900). Burroughs's work, whether as a critic of literature, as in his works on Walt Whitman, Emerson, and Thoreau, or of religion, as in *The Light of Day*, most fully reveals the original personality of the man. They are strongly subjective, but they have found an enthusiastic response in a limited circle. In books, as in nature, it is the unconventional that appeals to him, and his own literary quality gains its fascination rather from the acuteness of his observation than from any elaboration in literary expression. He sees so clearly that he makes his reader see the individualized lives of birds, flowers, fishes, and even insects. Burroughs is a born naturalist, and his wide reading in English literature has been done with an eye to nature that gives to his similes and descriptive phrases a distinct literary flavor. Here his nearest analogue in English literature is White of Selborne. A collected edition of Burroughs's *Works* was begun in 1895.

BURROUGHS, MARIE (1866—). The stage name of Lillie Arrington, an American actress, born in San Francisco. She made her first appearance in New York, at the Madison Square Theatre, in the part of Gladys in *The Rajah*. Other early successes were won in *Alpine Roses; Partners;* and *Saints and Sinners*. Afterwards she appeared for several seasons with E. S. Willard (q.v.), in such plays as *The Middleman* and *Judah*, and as Ophelia (1894). In 1894 she began starring in *The Profligate* and other pieces. Later she played in *The Gadfly* with Stuart Robson, and in *The Meddler*. In 1900 she appeared as Guida Landresse in *The Battle of the Strong*. Miss Burroughs is the wife of Robert Barclay MacPherson, her second husband, to whom she was married in 1901. Consult Strang, *Famous Actresses of the Day in America* (Boston, 1899).

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BURROWING BEE. Any of several kinds of bees that form burrows in the ground as nesting-places. Prominent among them are the genera Andrena and Halictus. See BEE; BUMBLEBEE; and Plate of WILD BEES.

BURROWING OWL, or COQUIMBO. A small owl (*Speotyto cunicularia*), that dwells in the abandoned burrows of various fossorial quadrupeds. It abounds on the open plains of both North and South America, those of South America constituting a well-marked geographical race; races also dwell scantily in Florida, and the islands of Bahama and Guadaloupe. They are of small size, about 9½ inches long, and have very long legs, scantily feathered; the tail is very short, there are no ear-tufts, and the sexes are alike in size and color, which is brownish above and buffy below, variously barred and spotted with somewhat darker tints. The South American race (called 'coquimbo') inhabits old burrows of the vizcacha, the Patagonian cavy, or even of armadillos and large lizards, and it is "generally believed that when they do not find suitable accommodations of this kind they dig holes for themselves." This race differs from the North American bird, which is diurnal, in being "crepuscular or nocturnal, . . . seldom feeding at all until toward sunset, when it becomes very active. On the pampas it is usually very tame, . . . but after sunset it becomes very vigilant, flying up and hovering at a height of 30 or 40 feet, and uttering its screams of protest whenever an intruder appears in sight, thus giving ample warning to its neighbors, the vizcachas" (*Stejneger*). The North American burrowing owls have been very thoroughly described by Dr. Elliot Coues in his *Birds of the Northwest*, from which the following is quoted:

"The burrowing owl is the only bird of its family inhabiting, in any numbers, the entirely treeless regions of the West, and may be considered characteristic of the plains. Wherever it can find shelter in the holes of such animals as wolves, foxes, and badgers, and especially of the various species of marmot squirrels, there it is found in abundance; and in not a few instances small colonies are observed living apart from their ordinary associates, in holes apparently dug by themselves. They constitute a notable exception to the general rule of arboricole habits in this family, being specially fitted by their conformation for the subterranean mode of life for which they are designed, and are furthermore exceptional in their gregarious disposition, here carried to the extreme. The diffusion of the species in the West is so general that there is little occasion to mention particular localities.

"The notes of the burrowing owl are peculiar. The birds do not 'hoot,' nor is there anything lugubrious or foreboding in their cry. Sometimes they chuckle, chatter, and squeal in an odd way, as if they had caught a habit of barking from the 'dogs' they live with, and were trying to imitate the sound. But their natural cry is curiously similar to that of the rain-crow, or cuckoo of America—so much so that more than one observer has been deceived. They scream hoarsely when wounded and caught, though this is but seldom, since, if any life remains, they scramble quickly into a hole and are not easy to recover. The flight is perfectly noiseless, like that of other owls, owing to the peculiar downy texture of the plumage. By day they seldom fly far from the entrance of their burrow, and raely, if ever, mount in the air. I never saw one on wing more than a few moments at a time, just long enough for it to pass from one hillock to another, as it does by skimming low over the surface of the ground in a rapid, easy, and rather graceful manner. They live chiefly upon insects, especially grasshoppers; they also feed upon lizards, as I once determined by dissection, and there is no doubt that young prairie-dogs furnish them many a meal. Under ordinary circumstances they are not very shy or difficult to procure; I once secured several specimens in a few minutes, and, I fear, left some others to languish and die in their holes. As commonly observed, perched on one of the innumerable little eminences that mark a dog-town, amid their curious surroundings, they present a spectacle not easily forgotten. Their figure is peculiar, with their long legs and short tail; the element of the grotesque is never wanting; it is hard to say whether they look most ludicrous as they stand stiffly erect and motionless, or when they suddenly turn tail to duck into the hole, or when engaged in their various antics."

Their nests are made of soft materials in this underground chamber, and contain seven or eight white eggs. They remain throughout the winter in and about their holes, though some may migrate from the most northerly and inclement part of their range. The story that they hibernate is fictitious. It is scarcely necessary also to refute at length, as does Dr. Coues, the fable that they live harmoniously—a sort of happy family—with the prairie-dogs and prevalent rattlesnakes. They are unwelcome neighbors to (not co-tenants with) the squirrels, and the rattlesnakes enter the burrows as enemies to both. See OWL; and Plate of OWLS.

BURROWING PERCH. See CULPER.

BUR'ROWS, WILLIAM (1785-1813). An American naval officer. He was born near Philadelphia, entered the United States Navy as a midshipman in 1799, and served as an acting lieutenant in the Tripolitan War. In the war with England he commanded the *Enterprise* in the engagement with the *Boxer* off Portland, Maine, on September 5, 1813. The *Boxer* was taken; but Burrows was mortally wounded, and lived only long enough to receive the surrender of Capt. Samuel Blythe, the English commander, who was also killed. The bodies of the two officers were buried side by side in Portland.

BURRSTONE. See BUHRSTONE.

BURSAR, BURSARY, or **BURSE** (*Burse* is a doublet of *purse*, Fr. *bourse*, pouch, from Low Lat. *bursa*, purse, Gk. *βύρσα*, *byrsa*, hide, skin). In the universities of Great Britain, especially in those of Scotland, and in early New England usage, the term bursar was not restricted to the keeper of a burse or purse—the treasurer—but it might mean, and often did mean, the recipient of a burse, or bursary, or, as we should say, the holder of a scholarship. The conditions under which these bursaries have been bestowed vary in different places. In Scotland the number of bursaries or foundations for the encouragement of students has been very

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large, and in recent years there has been a great deal of discussion of their influence—whether or not the conditions under which they have been awarded are as favorable as they might be to the promotion of learning. In a monastery the bursar would be the one who held and disbursed the income. In this sense the office is still maintained in Harvard University, where the bursar is a sort of sub-treasurer, charged with certain intramural duties, under the direction of the treasurer.

BURSCHENSCHAFT, bōōr'shen-shäft (Ger. *Bursche*, fellow, apprentice, student, from MHG. *burse*, purse; society, especially of students, with a common purse). An association of students in the German universities to promote patriotism, morality, and love of liberty. The earliest organization was at Jena in 1815, and its membership was chiefly made up of students who had fought in the War of Liberation. The idea spread to Tübingen, Heidelberg, Halle, and Giessen. In 1817, the occasion of the three hundredth anniversary of Luther's initiation of the Reformation, a general gathering took place at the Wartburg, and the following year a constitution was adopted by delegates from fourteen universities. Black, red, and gold, since taken as the national colors of the new German Empire, were adopted as the colors of the association. The murder of Kotzebue by Sand, a fanatical student, in 1819, injured the movement for freedom in Germany and led to repressive measures, such as the Karlsbad Decrees (q.v.), which required the suppression of the Burschenschaft, but secret meetings were still held, and there was a revival of the organization in 1827. The Burschenschaft participated in the Liberal demonstration known as the Hambach Festival in 1832. A revolutionary attempt took place at Frankfort-on-the-Main in 1833, in which nearly 2000 students were implicated, and in nearly all of the German universities students were arrested, imprisoned, and disfranchised. The ideals of the Burschenschaft were unattainable and vague; but they served well at a trying time to keep alive the spirit of German unity.

BUR'SERA'CEÆ (Neo-Lat. *Bursera*, from Joachim Burser, a German botanist). An order of dicotyledonous plants with 13 genera and more than 300 species, most of which occur in the tropics of both hemispheres, although a single species of Bursera is found in Florida. The species of this family are trees and shrubs with alternate—mostly compound—dotted leaves. The entire order is noted for the balsams and resins obtained from its representatives. The flowers are generally small, 4-5 parted, carpels 3-5, with usually 2 ovules in each. The fruit is a drupe or a capsule. The chief genera are Commiphora, Bursera, Boswellia, Canarium, and Protium. For some of their products see ELEMI; MYRRH; BALSAM; BDELLIUM; OLIBANUM; FRANKINCENSE, etc.

BURSIAN, bōōr'sē-ân, KONRAD (1830-83). A German archæologist and classical philologist. He was born at Mutzschen, in Saxony, was educated in Leipzig, and held professorships in the universities of Leipzig, Tübingen, Zurich, Jena, and Munich. His chief works are *Geographie von Griechenland* (1862-72), and *Geschichte der klassischen Philologie in Deutschland* (1883). He also founded (1873) and edited the *Jahresbericht über die Fortschritte der klassischen Alterthums-wissenschaft*.

BURS'LEM (*Burward's* dwelling on the *loam*, AS. *lām*, Ger. *Lehm*, clay). A town of Staffordshire, England, on the Trent and Mersey Canal, about 20 miles north-northwest of Stafford. It is in the pottery district (Map: England, D 3). Its two principal buildings are the Wedgwood Memorial Institute, opened in 1870, and containing an art school, a library, and a museum; and a fine town hall, erected in 1865. The town was incorporated in 1878. The abundance of coal and the variety of clays have made Burslem, since the Seventeenth Century, one of the chief seats of the fictile manufacture. Porcelain and pottery of all kinds—Parian, iron, and stone ware, etc.—are produced on a large scale, as well as encaustic tiles. There is also a glass manufactory here. The town's sewage is disposed of by irrigation and the refuse by a destructor. It owns its gasworks, on which it makes a small annual profit; and its markets, which net about $5000 annually. There are public baths. At Birche's Head, a mile and a half from Burslem, stands a large service reservoir of the Staffordshire Waterworks Company, from which the town and neighborhood are supplied with excellent water. Population, in 1891, 32,000; in 1901, 38,800. Burslem was the native place of Josiah Wedgwood (q.v.).

BURT, WILLIAM A. (1792-1858). An American surveyor. He was born in Worcester, Mass., but in 1824 settled near Detroit, Mich. He became United States deputy surveyor in 1833, and in this capacity surveyed nearly the whole of northern Michigan (1840-47). He invented the solar compass, and in 1851 received the prize medal for it at the London Industrial Exhibition. He was judge of the Michigan Circuit Court, and as a member of the Legislature in 1852 was prime mover in the construction of the Sault Ste. Marie Canal.

BUR'TON (origin doubtful). A tackle used for special purposes. In rigged ships *top burtons* are hooked to burton pendants hanging from the topmast-head. They are also used as additional supports to yards when the latter are rigged for hoisting heavy weights and for other similar purposes. *A sail-burton* is a tackle for hoisting sails up to the yards for bending; the chief peculiarity is a runner, or guide-block, which is lashed to the lower block of the purchase and travels on the hauling part, thus preventing the tackle from twisting and the sail from swaying about as it goes aloft. See TACKLE.

BURTON, JOHN HILL (1809-81). A Scotch jurist, historian, and encyclopædist, born in Aberdeen, August 22, 1809. He graduated at Marischal College, Aberdeen, studied law, and was admitted to the Edinburgh bar, but supported himself chiefly by literature. From 1833 he contributed articles on law, history, and political economy to the *Westminster Review*, literary sketches to *Blackwood's Magazine*, and also wrote for the *Cyclopædia of Universal Biography*, *Waterson's Cyclopædia of Commerce*, and *Chambers's Encyclopædia*. In 1854 he was relieved from monetary precariousness by a governmental appointment. His most important original work is *The History of Scotland, from Agricola's Invasion to the Revolution of* 1688 (7 vols., 1867-70). A new edition, enlarged and

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partly rewritten, appeared in 8 vols., 1873. In 1879 he published a *History of the Reign of Queen Anne*. The merits of Burton's historical works are universally admitted. He held the ancient office of historiographer royal for Scotland, was LL.D. of Edinburgh University, and D.C.L. of Oxford. He died near Edinburgh, August 10, 1881. Consult: "Memoir of Burton," in *Blackwood's Magazine* (September, 1881); and a *Memoir* by his wife, prefixed to *The Book Hunter* (New York, 1863).

BURTON, RICHARD (1859—). An American poet. He was born in Hartford, Conn., March 14, 1859. He was graduated at Trinity College (1883) and Johns Hopkins (1887); was managing editor of *The Churchman* (1889-90); literary editor of the Hartford *Courant* (1890-97), and professor of English literature in the University of Minnesota (1893-1902), and afterwards literary adviser of D. Lothrop & Co. His poems are collected in *Dumb in June* (1895); *Memorial Day* (1897); and *Lyrics of Brotherhood* (1899). He published also *Dogs and Dog Literature, Literary Likings* (1898), *John Greenleaf Whittier* (1901), and *Forces in Fiction* (1902).

BURTON, Sir RICHARD FRANCIS (1821-90). A British traveler and author, born in Hertfordshire, England, March 19, 1821. In 1842 he entered the Indian Army, and served many years in Sindh. In 1851 he published his first important work—*Sind, and the Races that Inhabit the Valley of the Indus*, full of graphic description, and interesting to all readers. Burton acquired a very familiar acquaintance with Hindustani, Persian, and Multani, and learned to speak Arabic like a native. Thus equipped, he resolved to explore Arabia in the disguise of an Afghan pilgrim. Political commotions prevented him from traversing the whole country, as he intended; but his *Personal Narrative of a Pilgrimage to El Medinah and Meccah* (1855) records an extraordinarily daring feat. His next journey was into the country of the Somalis, in Eastern Africa. His companion, Lieutenant Stroyan, was killed and he himself was wounded. He succeeded, however, in reaching Harrar, a town not before visited by any European, and in penetrating a vast and populous region scarcely known to geographers. Toward the end of 1856 he set out, in company with Lieutenant Speke, also of the Indian Army, to ascertain the truth of the reports collected by the missionaries that a vast lake existed in the heart of Africa. The journey led to the discovery in 1858 of the great lake of Tanganyika (followed by the discovery of the Victoria Nyanza by Speke) and the opening up of the eastern part of the continent. In 1861 Burton was appointed consul at Fernando Po, on the west coast of Africa, and while holding this appointment he visited the Kamerun Mountains, and went on a mission to the King of Dahomey, the incidents of both journeys being recorded in two of his most interesting works. He was subsequently consul at Santos in Brazil and at Damascus, and on the death of Charles Lever, in 1872, he succeeded to the post of British consul at Triest. He died October 20, 1890. Among his many works are the following: *Sind; or, the Unhappy Valley* (1851); *Goa and the Blue Mountains* (1851); *Falconry in the Valley of the Indus* (1852); *First Footsteps in East Africa* (1856); *The Lake Regions of Equatorial Africa* (1860); *The City of the Saints* (1861); *Abeokuta; or, the Cameroon Mountains* (1863); *The Nile Basin* (1864); *A Mission to Gelele, King of Dahomey* (1864); *Explorations in the Highlands of Brazil* (1869); *Vikram and the Vampire* (1870); *Zanzibar* (1872); *Gorilla Land* (1875); *Ultima Thule; or, a Summer in Iceland* (1875); *Etruscan Bologna* (1876); *Sind Revisited* (1877); *The Gold Mines of Midian and the Ruined Midianite Cities* (1878). In 1885-88 he published, with a remarkable introduction and valuable notes, a literal translation of the *Arabian Nights* under the title of *The Thousand Nights and a Night* (10 vols. and 6 vols. of supplement), of which his wife issued an expurgated edition in 6 vols. (1887). In 1894 appeared the Library edition, 12 vols., an abridgment of the original publication. He left a manuscript to his widow, Lady Isabel Burton, consisting of a translation, with original notes, from the Arabic of *The Scented Garden*, which she destroyed as a moral act, though it was deemed of great importance by scholars, and had been valued at $30,000. A literal translation of the *Pentamerone* by Burton was published posthumously (1893). To Burton we are also indebted for the best English translation of the *Lusiads* and the lyrics of Camoens (1881-84). For his life, consult: Hitchman (London, 1887); Lady Burton (New York, 1893); and Stisted (New York, 1897); also Lady Burton and W. H. Wilkins, *The Romance of Isabel, Lady Burton* (New York, 1897).

BURTON, ROBERT (1577-1640). The author of the *Anatomy of Melancholy*. He was born at Lindley, in Leicestershire, February 8, 1577, and was educated at Brasenose and Christ Church, Oxford. In 1616 he was appointed to the vicarage of Saint Thomas, in the west suburbs of Oxford; and about 1630 to the rectory of Segrave in his native county. Though he officiated at Saint Thomas for a time, he passed his life almost wholly at Christ Church, where he died January 25, 1640, at or near the time he had foretold by the calculation of his horoscope. To the Bodleian Library he left his rare collection of books. His brother erected a monument to his memory in the Cathedral of Christ Church. Anthony Wood, in the *Athenæ*, thus wrote of him: "He was an exact mathematician, a curious calculator of nativities, a general read scholar, a thorough-paced philologist, and one that understood the surveying of lands well. As he was by many accounted a severe student, a devourer of authors, a melancholy and humorous person, so by others who knew him well, a person of great honesty, plain-dealing, and charity. I have heard some of the antients of Christ Church often say that his company was very merry, facete, and juvenile." *The Anatomy* was first published in 1621. Burton was constantly revising his work, of which four more editions appeared during his life. After his death the final version was printed from his annotated copy (1651-52). Burton dedicated himself to melancholy, analyzing its various manifestations after the formal manner of treatises on divinity. His book is one of the most curious and interesting in the whole realm of literature. Dr. Johnson said that it "was the only book that ever took him out of bed two hours sooner than he wished to rise." Milton read it, deriving hints for *Il*

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Penseroso; Sterne pillaged it; Lamb admired it and imitated its quaint style. Consult: *The Anatomy,* edited by Shilleto, with introduction by Bullen (London and New York, 1893).

BURTON, WILLIAM EVANS (1804-60). An English actor and playwright, born in London, a son of William George Burton, author of *Biblical Researches.* He was intended for the Church, and received a classical education, but at eighteen took charge of his father's printing establishment and edited a magazine. From amateur acting he drifted toward the regular stage, and made a successful début at the Haymarket in 1832. He began also to write dramas, one of which was played simultaneously at five London theatres. In 1834 he came to the United States, where he was prominent as actor or manager, chiefly in Baltimore, Philadelphia, and New York. In Philadelphia he established the *Gentleman's Magazine,* a literary monthly. His greatest success was in the management of the Chambers Street Theatre, in New York City, where, with Brougham and others, he produced dramas from several of Dickens's novels. His own forte was low comedy, and some of his characters were very popular. Such were *Captain Cuttle, Toodles, Micawber, Aminadab Sleek, Paul Pry,* and others. He was a fine scholar, and had a superior library, particularly of Shakespearean literature. He was for several years the editor of the *Literary Souvenir,* and published in two volumes a *Cyclopædia of Wit and Humor.*

BURTON JUNIOR. The *nom de plume* under which Charles Lamb wrote "On the Melancholy of Tailors," in Leigh Hunt's Magazine, *The Reflector* (1810).

BURTON-UPON-TRENT. A town in Staffordshire, England, about 11 miles southwest of Derby, on the river Trent and the Trent and Mersey Canal (Map: England, E 4). A bridge of 34 arches, built before the Norman Conquest, crossed the river here, but was replaced in 1864 by a new one of 29 arches. Burton-upon-Trent at one time was quite celebrated for its cotton-mills, but this industry has been entirely superseded by that of ale-brewing. There are over thirty breweries in Burton, some of them on a scale of unparalleled magnitude. The two establishments of Bass and Allsopp cover together more than 250 acres of ground, and can produce yearly about 2,000,000 barrels of ale. The town was incorporated in 1878. Its water-works are in the hands of a private company. Its sewage is disposed of by irrigation. The town has owned its gas-works since 1876, and makes an annual profit of about $30,000. It has also operated an electric-light plant since 1894 at a considerable profit. It maintains public baths, markets, a cemetery, and a library. The increase of the population since 1870, when it was about 20,000, has been very rapid. In 1891 it was 46,000, and in 1901, 50,400. The town dates from the end of the Ninth Century, when it grew up around an abbey founded at that time. It suffered severely during the civil wars in the Seventeenth Century.

BURTSCHEID, bōōrt'shīt (Lat. *Porcetum,* Fr. *Bourcette*). A southern suburb of Aix-la-Chapelle (q.v.), formerly an independent municipality in the Rhine Province, Germany. It is noted for its numerous thermal springs and manufactures of iron, steel, needles, and woolen goods. Population, in 1895, 15,871.

BURT'SELL, RICHARD LALOR (1840-1902). An American Roman Catholic priest. He was born in New York, April 14, 1840. He pursued his studies at the Propaganda in Rome, taking his degree there, and receiving his ordination in 1862. Returning to New York, he was appointed assistant pastor of Saint Anne's Church, and in 1868 assigned to the new parish of the Epiphany. He was the first incumbent in the office of "Defender of the Marriage Tie" (q.v.), instituted in America by the Third Plenary Council of the Catholic Church, held in Baltimore in 1884. In 1887 he identified himself with a movement in which the Rev. Dr. McGlynn (q.v.) was concerned, and was counsel and adviser to Dr. McGlynn after his suspension from priestly functions. This involved him in personal trouble. He was removed from the office of "Defender of the Marriage Tie" in 1887; official notice of his action was taken in 1889; and he was ordered to retire from his position as pastor of the Church of the Epiphany to a small parish in Rondout, N. Y. He appealed from the order of the Archbishop to the Propaganda at Rome, and by that body was ordered to make his submission to the Archbishop. He preached his farewell sermon to his congregation in July, 1890; appealed to Rome for reinstatement, and was refused in 1896.

BURU, bōō'rōō, **BOEROE,** or **BOORO.** An island of the Molucca group of the Dutch East Indies, situated about 40 miles west of Amboyna and Ceram, from which it is separated by Buru Strait. It lies between latitudes 3° and 4° S., and longitudes 126° and 127° 20′ E. (Map: Islands of the Pacific, E 3). Its length is about 90 miles, and its area about 3380 square miles. It is very mountainous, especially in the western part, Mount Tumaha rising to 8530 feet, and is thickly wooded. The population is estimated at 60,000; the chief town is Cajeli, on the eastern coast. Administratively it is a dependency of Amboyna.

BURUJIRD, bōō'rōō-jĕrd'. A town in the Province of Irak-Ajemi, Persia, situated in a fertile valley about 190 miles northwest of Ispahan. It has a castle and several mosques, and some manufactures of cotton goods and felt. It has a trade in skins with Russia and is connected by roads with Ispahan and Hamadan. Population, about 20,000.

BURUNDUK, bōō'rŭn-dōōk' (Russ., a species of squirrel). A striped ground-squirrel (*Tamias Asiaticus*) of northern Asia and Europe, closely resembling in appearance and habits the American chipmunks.

BURY, bĕr'ĭ (AS. *burh,* fort, borough). A flourishing manufacturing town in the southeast of Lancashire, England, on rising ground, backed by hills on the north and east, and on the Irwell, 8 miles northwest of Manchester (Map: England, D 3). Bury obtained a charter of incorporation in 1876. The town's affairs are administered by a mayor, a municipal council of 29, and a board of aldermen of 10 members. (See GREAT BRITAIN, *Local Government.*) The town has an excellent water-supply with a daily output of nearly 7,000,000 gallons; modern sewage-works, and has owned and operated gas-works since 1858, and an electric-light plant since 1896.

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Among other municipal undertakings are public baths, opened in 1864, markets, and an infectious diseases hospital. Bury was early a seat of the woolen manufactures, carried on by Flemings; but these, though still considerable, now yield in importance to those of cotton. Besides spinning and weaving factories, there are important print, bleach, paper, and dye-works, and some large foundries and engine manufactories. In the vicinity are excellent freestone-quarries, and abundant coal-mines. Population, in 1891, 57,262; in 1901, 58,028.

BURY, bū'rĭ, JOHN B. (1861 —). An Irish scholar. He was educated at Trinity College, Dublin, of which he became fellow and tutor in 1885. In 1893 he was appointed professor of modern history in Dublin University. In 1898 he was transferred to the chair of Greek. He edited the Nemean Odes of Pindar (1890), the Isthmian Odes (1892), Freeman's *History of Federal Government in Greece and Italy* (1893), and Gibbon's *Decline and Fall* (1896-99). His other publications include a *History of the Later Roman Empire from Arcadius to Irene* (1889) and a *Student's History of the Roman Empire from Augustus to Marcus Aurelius* (1893).

BURY, RICHARD DE (1281-1345). An English prelate, so called from his birthplace, Bury Saint Edmunds; his real name was Aungerville. He was educated at Oxford and became a Benedictine monk at Durham; was tutor to Edward III.; was appointed Dean of Wells in 1333, and in the same year was sent on a mission to the Pope, who made him Bishop of Durham. He held the office of High Chancellor (1334-35), and then became one of the King's ambassadors in foreign countries. He was noted for his beneficence, and founded a large library in connection with Durham College, Oxford (afterwards suppressed). His chief work, *Philobiblon* (English version, London, 1834), describes his manner of collecting books, and gives an account of the state of learning in England and France. He was a friend of Petrarch at Avignon.

BURY (bĕr'ĭ) **FAIR.** The title of a play following the lines of Molière's *Précieuses ridicules*, by Thomas Shadwell (1690).

BURYING BEETLE. The largest of the carrion-beetles, Silphidæ, belonging to the genus Necrophorus (Gk. νεκρός, dead + φέρω, carry). The name burying or sexton beetles has been given them on account of their habit of burying the dead bodies of small vertebrates as a nidus for their eggs and food for the young. This they accomplish by digging away the earth beneath the body until the latter sinks below the surface of the ground. The excavated soil is then heaped over the body, after which the female burrows down to it and deposits her eggs in it, and when the larvæ hatch they feed on the carcass. The largest North American species is *Necrophorus Americanus*, 1½ inches long. It is a black beetle with a red head and two red spots on the clytra. A smaller form is common in the eastern United States. See colored Plate of BEETLES.

BURY SAINT EDMUNDS, or **SAINT EDMUNDSBURY** (borough in memory of Saint Edmund, the martyr). A market town and ancient borough in Suffolkshire, England, on the Lark, 26 miles northwest of Ipswich (Map: England, G 4). It is well built and delightfully situated. The chief commercial interest of the town is in the corn and cattle markets held there. The town abounds in historical remains, the more important of which are: the ruins of the famous Benedictine abbey, consisting of a western gate, a handsome specimen of decorated Gothic, and the tower or church-gate, a fine example of massive Norman; and the Gothic churches of Saint James and Saint Mary, the latter containing the tomb of Mary Tudor, daughter of Henry VII. of England and wife of Louis XII. of France. The town sends one member to Parliament. It owns its water-works, and maintains public baths, markets, a hospital, and a school of art. Population, in 1891, 16,630; in 1901, 16,255.

Bury Saint Edmunds, originally Beodricsweorthe, received its name from Edmund, the Saxon King and martyr, who was killed here in 870 by the Danes, and whose tomb became a noted shrine of pilgrimage. Here Canute raised a Benedictine abbey, which after Glastonbury became the richest and most important in England. Between the abbots and the townspeople frequent battles occurred. From 1020 to its dissolution by Henry VIII., it was ruled over by a line of 33 abbots. Consult Hill, "Antiquities of Bury Saint Edmund," in *Archæological Journal*, Vol. XXI. (London, 1865).

BUSACO, bōō-sä'kô. A ridge on the north side of the River Mondego, in the Province of Beira, Portugal, about 20 miles north-northeast of Coimbra. Here Wellington, with about 40,000 British and Portuguese troops, repulsed the attack of Masséna with 65,000 French, September 27, 1810. Unable to force the position, Masséna turned it by passing over an adjoining ridge, and Wellington retired behind the lines of Torres Vedras.

BUSBECQ, bus'bĕk', **BUSBEC,** or **BUSBEK,** AUGIER GHISLAIN DE (Latinized Busbequius) (1522-92). A Flemish diplomat and scholar, born at Comines. He received the best university training of his day at Louvain, Paris, and various Italian universities, and entered the service of Ferdinand, King of the Romans, whose ambassador he accompanied to England in 1554. From London he was sent to the Turkish Court, where for eight years he rendered important diplomatic services. In 1562, however, he was recalled to become tutor and guardian to the sons of Maximilian II., and from 1570 he held the post of master of ceremonies to the Archduchess Elizabeth, widow of Charles IX. of France. He was also employed by the Emperor Rudolph II. as ambassador at Paris. On quitting this post in 1592, Busbecq set out for Flanders, but died on the way at the castle of Maillot, near Rouen, October 28, 1592. Busbecq's most important work is his volume of letters from Turkey—*Legationis Turcicæ epistolæ quatuor* (Paris, 1589)—a scholarly study of the Ottoman power. His *Epistolæ ad Rodolphum II. Imperatorem, e Gallia scriptæ* (Brussels, 1631), contains much interesting information on contemporary French history. His other works have been lost. A collected edition of his extant works appeared at Leyden (1633), and another at Basel (1740). He has been frequently translated into French, German, and English. His Latin style is pure, elegant, and simple. Busbecq was a great collector of manuscripts, and gave over one hundred to the library at Vienna. He was also a botanist and introduced the horse-chestnut tree into

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Europe. Consult: Forster and Daniell, *The Life and Letters of Ogier Ghiselin de Busbecq* (London, 1881), which contains his most important writings; also, De Thou, *Histoire de mon temps* (Paris, 1604); Saint-Genois, *Les voyageurs belges* (Brussels, 1847); Dupuis, "Etude sur l'ambassade d'Augier de Busbecques en Turquie," in *Mémoires de la Société des Sciences de Lille.*

BUSBY, bŭz'bĭ (probably from a proper name). The full dress or 'review' uniform headgear of different branches of the British Army. In the Hussar Cavalry and Royal Horse Artillery the busby is of fur, with a cloth top, from which is suspended on the right side a cloth bag, known as the busby-bag, which is of the same color as the facings of the regiment, as is also the tuft or plume worn on the top front of the busby. The massive busby worn by the Foot Guards is made of expensive bearskin over a skeleton framework, and in the case of commissioned officers surmounted by a lofty white plume. The Highland regiments wear a busby after much the same pattern as the Foot Guards, but of somewhat smaller proportions and far less intrinsic value. The Rifle Brigade wear a busby of modified shape, made of astrakhan with a small stiff plume in front. In the case of the Guards, Highlanders, and Rifle Brigade, the busby is without bag or busby-cords. The busby, like the brilliant uniform of which it forms a part, is worn only in times of peace. On active service it is superseded by the helmet and 'puggaree.'

BUSBY, Richard (1606-95). A noted English schoolmaster. He was born in Lutton (or Sutton), Lincolnshire; was educated at Westminster School and at Oxford, and in 1638 received the provisional appointment of headmaster of Westminster School, the duties of which office he continued to discharge until his death. As a pedagogue he was conspicuous alike for learning, assiduity, and the application of the birch. He was a most successful teacher, and at one time could point to no less than sixteen occupants of the bench of bishops who had been educated in his school. Altogether, he has the reputation of having 'bred up the greatest number of learned scholars that ever adorned any age or nation.' Dryden, Locke, and Robert South were among his pupils. Dr. Busby published several works, but they were chiefly expurgated editions of the classics for school use.

BUSCH, bŭsh, Moritz (1821-99). A German publicist. He was born in Dresden, studied theology and philosophy in Leipzig, and began literary life as a translator of Dickens, Thackeray, and other English authors. In 1851 he visited the United States, and on his return published *Wanderungen zwischen Hudson und Mississippi* (1853) and *Die Mormonen* (1857). He then engaged in newspaper work, and attracted Bismarck's attention by his articles in the *Grenzboten*. On April 1, 1870, he received an appointment in the German Foreign Office, but his real function was that of a reporter for the press to Prince Bismarck. From that time and for many years he was the inseparable companion and confidant of the Chancellor, taking daily notes of his sayings and doings, and earning for himself the title of 'Bismarck's Boswell.' In 1878 he published a part of his diary, kept during the Franco-Prussian War, under the title of *Graf Bismarck und seine Leute während des Kriegs mit Frankreich;* this was published also in English in 1879. In 1884 he published the life of his hero, which was soon issued in an English translation under the title *Our Chancellor.* Two months after the death of Bismarck Dr. Busch published a large work, which was immediately translated into English under the title *Bismarck: Some Secret Pages of His History* (1898).

BUSCH, Wilhelm (1826-81). A German surgeon, born in Marburg. He studied at the University of Berlin; was in 1855 appointed professor of surgery at Bonn, and afterwards acted as consulting surgeon-general in the army in 1866 and during the Franco-Prussian War. His published works include the following: *Chirurgische Beobachtungen, gesammelt in der Klinik zu Berlin* (1854); *Lehrbuch der Chirurgie* (2 vols., 1857-69).

BUSCH, Wilhelm (1832—). A German humorous artist and rhymester, born at Wiedensahl, Hanover. He began to draw for the *Fliegende Blätter* in 1859. His earlier manner displayed satirical skill and much facility in characterization by slight outline strokes, but his later work lacks form and finish. He published a series of sketches, for which he himself composed suitable text, and which have become exceedingly popular throughout Germany. This includes *Max und Moritz; Hans Huckebein, der Unglücksrabe; Der heilige Antonius von Padua; Die fromme Helene;* and *Pater Filucius.*

BUSCHE, bŭ'she, Hermann von dem (1468-1534). A German scholar, born at Sassenberg, in Westphalia. He studied at Heidelberg, at Tübingen, and in Italy, where he became versed in Latin, and after his return to Germany traveled about from one university centre to another, lecturing on the classic literature and antiquities. He is said to have written some of the *Epistolæ Obscurorum Virorum.* At all events, he joined the leaders of the Reformation, was a friend of Ulrich von Hutten, and in 1527 was appointed first professor of classical literature at the University of Marburg, founded in that year by Landgrave Philip the Magnanimous. He wrote three books of epigrams, a defense of humanistic studies entitled *Vallum Humanitatis* (1518), and other works. Consult Liessem, *Leben und Schriften* (Cologne, 1884-89), which contains a bibliography.

BÜSCHING, bŭ'shĭng, Anton Friedrich (1724-93). A German geographer. He was born in Stadthagen, in Schaumburg-Lippe, and studied theology at Halle, where he enjoyed the friendship of Baumgarten. In 1754 he was appointed professor of philosophy in Göttingen, but in 1761 accepted an invitation to Saint Petersburg as preacher to a Protestant congregation there. In 1766 he was called to Berlin as superior consistorial councilor and director of a gymnasium, and died there. Until the appearance of Büsching's *Neue Erdbeschreibung* (11 vols., 1754-92), neither Germany nor any other nation possessed a geographical work which made any pretension to scientific treatment or completeness of execution. Political changes have deprived the work of its original value, but it has been corrected and edited by subsequent writers. Of his other numerous publications, the most important is the *Magazin für Historiographie und Geographie* (25 vols., 1767-93).

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BÜSCHING, JOHANN GUSTAV GOTTLIEB (1783-1829). A German antiquary, son of the preceding, born in Berlin. He studied at Erlangen and Halle, was appointed royal archivist at Breslau in 1811, and in 1817 professor of archæology in the University there. His knowledge of subjects appertaining to the Germany of the Middle Ages was remarkable. His works include a *Sammlung deutscher Lieder*, with musical accompaniments (1807); *Deutsche Gedichte des Mittelalters* (3 parts, 1808-25); and *Des Deutschen Leben, Kunst, und Wissen in Mittelalter* (4 vols., 1816-18).

BUSCHMANN, bush'mân, JOHANN KARL EDUARD (1805-80). A German philologist, born at Magdeburg. He studied at the universities of Berlin and Göttingen, and collaborated with the brothers von Humboldt in the preparation of their works, particularly with Alexander in the *Kosmos* (1845-58). His researches in comparative philology were very important. They were directed chiefly toward the dialects of Malaysia and Polynesia, and those of central and northwestern America. Many of the results of this work are to be found in the *Kawisprache auf der Insel Java* (3 vols., 1836-39) of W. von Humboldt, which, after Humboldt's death, Buschmann completed and edited for the press. His own publications include *Aperçu de la langue des Iles Marquises et de la langue taïtienne* (1843); *Ueber die aztekischen Ortsnamen* (1853); *Die Spuren der aztekischen Sprache im nördlichen Mexiko* (1859); and *Grammatik der sonorischen Sprachen* (3 parts, 1864-69).

BUSENBAUM, bōō'zen-boum, HERMANN (1600-68). A German Jesuit, known as a casuist. He was born at Notteln, in Westphalia, and entered the Jesuit order in 1619, taught scholastic and moral theology in Cologne, and was rector successively of Jesuit colleges in Hildesheim and Münster. In 1645 he published his *Medulla Theologiæ Moralis, Facili ac Perspicua Methodo Resolvens Casus Conscientiæ*, in seven books. This work passed through forty-five editions between 1645 and 1670, and has since been frequently reprinted. It met no considerable opposition until it appeared in 1729 in Lyons and in 1716-33 in Cologne, edited by Lacroix, with a commentary and supplementary material from other casuists. Its teachings concerning murder, and particularly regicide, were emphasized through the attempted assassination of Louis XV. of France by Damiens in 1757. It was publicly condemned by the Parliament of Paris, and burned by that of Toulouse. Although less bold in its declarations than some other Jesuit books, such as, for example, the *Defensio Fidei* (1613) of Francisco Suarez, it was the most complete and systematized in its exposition, and served as a type for succeeding treatises of the sort.

BUSENTO, bōō-sĕn'tô (anciently, Lat. *Bucentius*). A small stream in South Italy, which flows into the Crati at Cosenza (q.v.), and in the bed of which Alaric (q.v.) is said to have been buried, the stream having been temporarily turned aside from its channel in order to provide a secret grave.

BUSH, GEORGE (1796-1859). An American biblical scholar; born in Norwich, Vt. He graduated at Dartmouth College in 1818 and studied at the Princeton Theological Seminary from 1820 to 1822. He was pastor of a church in Indianapolis from 1824 to 1829, and was professor of Hebrew and Oriental literature at the University of the City of New York from 1831 to 1848. Among his works of that period were a *Life of Mohammed* (1832); a series of biblical commentaries under the title of *Notes on Genesis, Exodus*, etc. (1840-52); and *Anastasius; or the Doctrine of the Resurrection* (1844), in which he denied the existence of a material body in a future life. He embraced the doctrines of Swedenborg in 1847, and became editor of the *New Church Repository*. For his biography, consult Fernald (Boston, 1860).

BUSHBUCK (Dutch *boschbok*, bush-goat). A sportsman's name for several African antelopes frequenting bushy regions, especially two groups: (1) The genus Tragelaphus, otherwise known as 'harnessed' antelopes because of the often conspicuous vertical whitish stripes that characterize all except the most familiar bushbuck of South Africa, *Tragelaphus sylvaticus* (See colored Plate of ANTELOPES), which is also one of the smallest. These are among the handsomest of all antelopes in form and richness of color (which differs in the sexes), and they have been nearly exterminated by sportsmen south of the lake region. Another, the guib (*Tragelaphus scriptus*), is not larger than a goat, but the bongo of the equatorial west coast is 3 feet 7 inches tall; the nakong (*Tragelaphus Spekei*) is large and plain in color, and has a mane. (Compare KOODOO.) A very complete account of these antelopes was given by R. Crawshaw in the *Proceedings* of the Zoölogical Society of London, 1890. He says they are remarkably quick of hearing, and have an exceedingly loud and far-resounding bark. Leopards are their natural enemy, but in some regions they enjoy immunity from harm by men. "They are almost sure to be found in the native burial-places, which are grown up to thickets and avoided as ghost-haunted. . . . This fact has caused bushbucks to be regarded by many Nyassa natives as uncanny, and some natives will not eat their meat and do not like even to touch the skin." (2) The genus Cephalolophus. See DUIKER.

BUSH-DOG. (1) A small wild dog (*Icticyon venaticus*) of the Guiana highlands, "with close hair and short legs and tail, distinguished from all other dogs by its small size and by the reduction of the molar teeth to one in the upper jaw." It resembles a fox in appearance and hunts in packs. Consult: *Proceedings of the Zoölogical Society of London* (1879, p. 664; 1880, p. 70); *Field* (London, Feb. 21, 1880). (2) The Potto.

BUSHEL (OF. *bussel*, Low Lat. *bussellus*, from *bussula*, dim. of Lat. *buxus*, box; literally, something made of boxwood). A dry measure used in America for grain, fruit, etc. The quarter contains 8 bushels, and the bushel 8 gallons, the gallon measuring 277.274 cubic inches, and holding 10 pounds avoirdupois of distilled water.

BUSH-GOAT. A bushbuck, especially Cephalolophus.

BUSH-HOG. The bosch-vark. See RIVER-HOG.

BUSHIDO, bōō-shē'dô (literally *bu*, military + *shi*, knight + *do*, way). The precepts of knighthood, under which that unique figure in Japanese and Asian history, the Samurai (q.v.), was reared. As in Europe, chivalry grew out of feudalism, Christianity interpreting it with con-

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venient concessions, yet infusing it with spiritual data; so of Japanese chivalry, there were several sources, Buddhism, Shinto (q.v.), and Confucianism. (See CHU HI.) The characteristics of bushido were rectitude or justice, courage, benevolence, politeness, truthfulness, honor, and, above all, loyalty. It further inculcated in the Japanese knight, gentleman, and lady, self-control—the acme of which was realized in the institutions of suicide (see HARA-KIRI) and revenge, the girded sword being the soul of the Samurai. It gave lofty ideals and training, and a position to woman remarkable in Asia. Despite the abolition of feudalism, its mother and nurse, and the introduction of modern ideas and codes of law, bushido is still powerful as a regulator of Japanese life and institutions. Consult: Griffis, *The Religions of Japan* (London, 1895); Knapp, *Feudal and Modern Japan* (Boston, 1897); and Inazo Nitobe, *Bushido, the Soul of Japan* (Philadelphia, 1900).

BUSHING (Dutch *bus*, Ger. *Büchse*, box, from Lat. *buxus*). A perforated piece of metal screwed or pressed into place in certain machinery or objects for the purpose of receiving the wear of moving parts, to decrease the size of holes, or to secure a better joint, or one which will not stick; in the latter case the bushing is made of metal not very easily oxidizable, such as brass or bronze.

BUSHIRE, bōō-shēr′. See ABUSHEHR.

BUSHMAN RIVER. A short stream in the southeastern part of Cape Colony, South Africa, about 100 miles long (Map: Cape Colony, L 9). It flows southeast and empties into the Indian Ocean a few miles east of Cape Padrone.

BUSHMASTER ('master of the bush'). The largest known venomous snake (*Lachesis mutus*), a pit-viper of the rattlesnake family, closely related to the fer-de-lance, and inhabiting the Amazonian region. "In length it equals the hamadryad, and in thickness the large African viper." Specimens 9 feet in length were measured by Catherine Hopley, who thinks the snake may sometimes exceed this length; but Waterton's often-quoted description of size and 'rainbow colors' is certainly greatly exaggerated. In color it is pale yellow, darker on the back and lighter below, with a chain of rich chocolate-brown jagged rhomboid spots, edged with a darker color, along the back. The tail tapers suddenly, and terminates in several "rows of spiral scales, which are slightly recurved or hooked at their summit," forming the rudiments of a rattle, and ending in a horny tip or spine. Its

TAIL OF BUSHMASTER.

teeth and poison apparatus resemble those of a rattlesnake and the fangs are immense, making it a most deadly serpent, and one very greatly dreaded. It is said to prey largely upon other snakes, and its venom has been utilized in medicine. It is terrestrial in habits, not climbing trees, but living in dens and holes in the ground, and frequenting river-banks. Darwin made the following interesting remarks upon it in his *A Naturalist's Voyage* (London, 1860).

"Cuvier . . . makes this a sub-genus of the rattlesnake, and intermediate between it and the viper. In confirmation of this opinion, I observed a fact, which appears to me very curious and instructive, as showing how every character, even though it may be in some degree independent of structure, has a tendency to vary by slow degrees. The extremity of the tail of this snake is terminated by a point, which is very slightly enlarged; and as the animal glides along, it constantly vibrates the last inch; and this part striking against the dry grass and brushwood produces a rattling noise, which can be distinctly heard at the distance of 6 feet. As often as the animal was irritated or surprised its tail was shaken, and its vibrations were extremely rapid. . . . This Trigonocephalus has, therefore, in some respects the structure of a viper with the habits of a rattlesnake; the noise, however, being produced by a simpler device."

This habit of vibrating the tail when excited is, however, common to many serpents, as, for example, the North American copperhead (q.v.). The French name for this snake is *le muet;* and 'bushmaster' is sometimes applied in Guiana to any large and dreaded serpent. The native name most widely accepted is *surucucú*. Consult: Hopley, *Snakes* (London, 1882); Bates, *A Naturalist on the River Amazon* (New York, 1884); Moles and Urich, "Serpents of Trinidad," in *Proceedings Zoölogical Society of London* (London, 1894). See colored Plate of FOREIGN VENOMOUS SERPENTS.

BUSHMEN (*bush* + *man*, from Dutch *boschjesman*, as living in the bush), or HOTTENTOTS. Peoples of the deserts of southern Africa, comprising wandering bands of hunters, almost the lowest of human beings. They are short of stature (1.529 meters) and yellow-brown in color. Their language is harsh, abounding in clicks and having few words. They subsist on wild roots, berries, and plants, insects, snakes, and game, usually half cooked, though they are acquainted with boiling and make fire with the two-stick fire drill. Game is taken by means of traps, and fish are caught in nets, by poisoning the waters, or with harpoons; the dog is the only domestic animal. The Bushmen live in clefts of the rock and caves in the mountains; in the plains a hole dug in the ground and roofed with reeds forms the house. They keep a fire burning during the night. Their social organization is not well understood; yet they appear to be the remnant of an old stock, for their legends are numerous, and zoötheistic in character. They have a rude artistic sense, evidenced by rock paintings and petroglyphs. See colored Plate of AFRICAN RACES.

BUSH'NELL, HORACE (1802-76). An American theologian. He was born in Litchfield, Conn., April 14, 1802; graduated at Yale in 1827, where he studied law and theology; in 1833 became pastor of the North Congregational Church in Hartford, resigned 1859, and died there February 17, 1876. He was a voluminous writer on theological subjects, some of his works being *Principles of National Greatness; Christian Nurture* (1847); *God in Christ* (1849); *Christian Theology* (1851); *Sermons for the New Life* (1858); *Nature and the Supernatural* (1858); *Work and Play* (1864); *Christ and His Salvation* (1864); *Woman's Suffrage, the Reform Against Nature* (1869); *The Vica-*

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rious Sacrifice (1865). He was also a writer for various periodicals and newspapers. He was a bold and original thinker, with peculiar eloquence of style. Though strongly evangelical in belief, he denied the Calvinistic theory of the atonement (known as the 'satisfaction theory'), and gave less than the ordinary emphasis to the distinction between the persons in the Trinity. These, with other divergences, led to his being accused of heresy; but ultimately the fellowship of the Congregational churches was found broad enough to include him, and he kept his standing therein with growing influence until his death. During his later years his health compelled his relinquishment of the active pastorate, but his labors in authorship were unintermitted. While his theory of the atonement, the so-called 'moral-power' view, has not commended itself in its exact form to the majority of evangelical Christians, and is adhered to by no organized sect or party, it cannot be denied that his moral earnestness, his spiritual power, his wondrous suggestiveness, his brilliancy of thought and style, and his broad mental scope, have profoundly modified the thinking of the present age, through almost the whole circle of Protestant denominations. Indeed, with his detestation of all provincialism and sectarianism, he would have chosen any other form of influence rather than that which is exercised by the leader of a party in the Church. His select works appeared in a collected edition (8 vols., 1876-77). For his life, consult: M. B. Cheney, *Life and Letters of Horace Bushnell* (New York, 1880); T. T. Munger (Boston, 1899).

BUSH-QUAIL (Anglo-Indian). See BUTTON QUAIL.

BUSHRANGERS. An Australian term originally applied to runaway convicts, who had taken to the 'bush' and become robbers. Early in the Nineteenth Century they established a reign of terror in sparsely settled Van Diemen's Land. In 1814 a band of bushrangers, 27 in number, carried on their operations till, in 1815, martial law was proclaimed. Under Governor Arthur (1824-36), 103 of these criminals were executed in two years. In 1830 a severe Bushranging Act was passed in New South Wales, where a gang of 50 desperadoes fought regular engagements with the settlers and police, and surrendered only when a detachment of soldiers was brought up from Sydney. In later years bushranging has been facilitated by the local land laws, which allow people to settle in isolated spots among the mountains, outside the range of police supervision, and thus any scoundrel is permitted to choose the most remote haunt for his headquarters. The thickly wooded mountainous districts of eastern Victoria and New South Wales, with a cattle-dealing population that included numerous 'sympathizers,' offered shelter to many bushrangers. Among the more notorious bushrangers were Geary, in 1817 leader of a dozen desperadoes, who was hunted down and killed by soldiers; Michael Howe, the self-styled 'King of the Ranges,' killed in 1818; Morgan, after a series of murders and robberies, surrounded and shot in 1865; and the Kelly gang of four armor-clad men whose list of outrages ended at Glenrowan, Victoria, in June, 1880, when three were shot and the leader captured and hanged in Melbourne in November.

BUSH-TIT (titmouse of the bush). One of the diminutive titmice of the genus Psaltriparus. They are plain ashy-gray or olive-gray pygmies, paler or whitish below, without bright colors or conspicuous markings, and are scarcely 4 inches long. They are found in the western and southwestern United States and in Mexico. The nests are large, woven of various vegetable tissues, pensile, and with a lateral entrance. The eggs are six to nine in number, white, without markings.

BUSHWHACKER (*bush* + *whack*, to beat or hang about; hence to carry on guerrilla warfare). A term much in use during the Civil War in the United States (though well known before) to indicate men who pretended peace or neutrality, but who were ready to make secret attacks whenever opportunity offered. They were numerous in some Western States, where many of them were summarily shot as outlaws.

BUSHY RUN, BATTLE OF. See BOUQUET, HENRY.

BUSINESS HOURS. Those hours of the day during which places of business are customarily open. The business hours of banks vary in different places, but ordinarily cover a shorter period than the business hours of mercantile or manufacturing establishments. When negotiable paper is payable at a bank, it is to be presented for payment within the regular banking hours. When payable at any other place of business, presentment is good if made within the ordinary business hours of such places.

BUSIRANE, bū'sĭ-rān'. A magician in Spenser's *Faerie Queene*. For a long time he holds Amoret, Belphœbe's sister and Sir Scudamour's mistress, in his thrall. He is named after a mythical King of Egypt, Busiris, who was killed by Hercules.

BUSI'RIS (Gk. Βούσιρις, 'House of Osiris'). A city of ancient Egypt devoted to the cult of the god Osiris. It was situated about the centre of Lower Egypt, and is usually identified with the modern Abusir, just south of the parallel of 31°. There were several cities of the same name in Egypt. Another Busiris, whose modern name is also Abusir, was situated not far from Memphis and is well known for the pyramids in its vicinity.

BUSK, GEORGE (1807-86). An English scientist, born in Saint Petersburg, Russia. He studied surgery, in 1832 was appointed assistant surgeon to the seamen's hospital ship *Grampus*, subsequently was transferred to the *Dreadnaught*, and retired in 1855 with the rank of full surgeon. Subsequently he was occupied entirely with scientific pursuits. As the result of his earlier study he published his *Catalogue of Polyzoa in the British Museum* (1852-54), and his monograph on *Polyzoa of the Crag* (under the direction of the Palæontographical Society, 1859). Later he turned his attention to the Post-Tertiary mammalia derived from valley deposits and bone caves, and wrote papers on the rhinoceros, the hyena, the elephas (African elephant), and the extinct bears. He was also interested in ethnology. In 1850 he was elected a fellow of the Royal Society, and in 1859 fellow of the Geological Society of London. At the time of his death he was considered an authority on the lowest division of the molluscan series.

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BUSK, HANS (1815-82). One of the foremost originators of the volunteer movement in England. He was educated at King's College, London, and Trinity College, Cambridge, and in 1841 was called to the bar. While an undergraduate he sought to interest the Government in the establishment of rifle clubs as a means of national defense. Though discouraged by Lord Melbourne, he formed a rifle club at the university, in 1858 rehabilitated the Victoria Rifles, then the only existing volunteer corps, and furthered the enterprise by monographs and lectures. He was the first to suggest the advisability of life-ship stations, and equipped at his own expense a model ship. He also assisted in the founding of a school of cookery at South Kensington. His most important publication is *The Navies of the World, Their Present State and Future Capabilities* (1859).

BUSKIN (of uncertain origin). A kind of half-boot, lacing tight to the leg. The ancient tragic actors wore buskins (*cothurni*), often with thick soles, to add to their stature. Hence the buskin is often put for tragedy, as the slipper or sock (*soccus*, a flat-soled shoe) for comedy. The name is sometimes used by modern writers to describe the hunting boots worn by Diana, and often by other hunters or horsemen in ancient art.

BUS'RA. See BASRA.

BUSSA, bōōs'sä. See BUSSANG.

BUS'SANG. A town of Central Africa, in the British Niger Coast Protectorate (Map: Africa, E 3). It is situated on an island of the Niger and is surrounded by a wall. Its population is estimated at about 12,000. Bussang was the scene of Mungo Park's death.

BUSSEY, būs'ĭ, BENJAMIN (1757-1842). An American merchant and philanthropist, born in Canton, Mass. He served as a private soldier throughout the Revolutionary War; then began business in Boston, and accumulated a large fortune, which he bequeathed to Harvard University—one-half for the support of the law and divinity school and one-half for the foundation of the Bussey Institute, a school of agriculture and horticulture, for which special object he gave a large farm near Boston. His total bequest was estimated at $350,000.

BUSSLER, bụs'lẽr, LUDWIG (1838—). A German musical instructor and critic, born in Berlin. He was a pupil of Grell, Dehn, and Wieprecht, was for some time a musical director at Memel, in East Prussia, and later became an instructor in various conservatories in Berlin. In 1883 he was appointed musical critic of the Berlin *National-Zeitung*. He has published a number of text-books, including *Musikalische Elementarlehre* (1867; 7th ed., 1897); *Kontrapunkt und Fuge im freien Tonsatz* (1878); *Musikalische Formenlehre* (1878; 2d ed., 1894); *Kompositionslehre* (2 pts., 1878-79); a *Geschichte der Musik* (1882); and a *Lexikon der musikalischen Harmonien* (1889).

BUSSON, bụ'sôn', CHARLES (1822—). A French painter, born at Montoire, Loire et Cher. He was a pupil of Rémond and Français, and first exhibited in 1856. His landscapes have a poetical charm, and a certain elegance, but they suffer by comparison with the richer, weightier Barbizon pictures. His "La Chasse au Marais" and "Les Ruines du Château de Lavardin" are in the Luxembourg.

BUSSONE, bōōs-sō'nâ, FRANCESCO. See CARMAGNOLA.

BUSSORÀ, bōōs'sô-rà. See BASRA.

BUSSU (bụs'sōō) **PALM** (native Brazilian name). (*Manicaria saccifera.*) A South American palm, growing in the tidal swamps of the Amazon. The stem is 10 to 15 feet high, curved or crooked, and deeply ringed. The leaves are simple or undivided, and are the largest of the kind produced by any known palm, being often 30 feet long, and 4 or 5 feet wide. The flower clusters are branched, drooping, and the fruit is of an olive color, large, hard, and three-seeded. The leaves make excellent and durable thatch, being split down the midrib, and laid obliquely on the rafters, so that the furrows formed by the veins lie in a nearly vertical direction, and serve as so many little gutters to carry off the water. The spathe, taken off entire, is used by the Indians as a bag, or the larger ones are stretched out to make caps. When split, the spathes make a kind of strong, coarse cloth. A second species was formerly reported from Guatemala, but they are probably identical.

BUSSY D'AMBOIS, bụ'sê' dän'bwä'. The title of a play by George Chapman. The date of its first production is placed, on internal evidence, in 1604. A sequel, under the title *The Revenge of Bussy d'Ambois*, appeared in 1613, and an adaptation by D'Urfé in 1691.

BUSSY-RABUTIN, bụ'sê' rà'bụ'tăn', ROGER, Comte de. (1618-93). A French soldier and courtier, the author of the *Histoire amoureuse des Gaules* (1665). This work is a thinly veiled version of the notorious Court scandals of his own time, and in part, at least, of his own creation. It created a deep sensation and influenced the development of the realistic novel toward the fictitious memoir. Bussy-Rabutin was a relative of Mme. de Sevigné (q.v.), came of an illustrious family, and was educated by the Jesuits. The *Histoire* was written for private circulation among friends, but was surreptitiously copied and published by the Marchioness de Baume in Holland with an entirely superfluous key. Bussy-Rabutin was arrested (1665), imprisoned for thirteen months in the Bastille, and then exiled to Burgundy, where he spent the remainder of his life in peace. Meanwhile the work grew by unauthorized and more outrageous additions in prose and verse. Bussy's original portion is an airy, graceful, but very realistic picture of a corrupt society, which perhaps no other author could have given. Bussy's *Mémoires*, of minor interest, appeared in 1696, and his *Lettres* 1697-1709.

BUST (Fr. *buste*, It. *busto*, from Med. Lat. *bustum*, the trunk of the body). In plastic art, the name given to a representation in the round of the head, neck, and breast of the human body. It was a form of sculpture apparently unknown to Egyptian, Assyrian, and other Oriental arts, though the Egyptians of the early Empire made fine portrait heads. As early as the Sixth Century B.C. the Greeks made Hermæ, heads of Hermes or Dionysus, mounted on pillars, and this form, common for the ideal heads of the Sixth and Fifth centuries, was used as the favorite form of bust until the Roman period. At this time they were often made double—two

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heads back to back. It was not until Alexander's time that busts were commonly used for purposes of portraiture in Greece, for until then sculpture had concerned itself less with realistic reproduction than with types. After that time the bust became perhaps the favorite form of portraiture. The two most important known series are portraits of Alexander—with the head drawn down on one side and the eyes raised—and of his successors the Ptolemies of Egypt and the Seleucids of Syria, as well as the minor kings of the Hellenic East, such as the Attalids. Another large class of Hellenistic busts are those of men of letters—poets, philosophers, orators—such as Plato, Zeno the Stoic, Epicurus, and other philosophers, of Isocrates and Demosthenes. To these authentic portraits should be added ideal heads of earlier personages, such as Homer, Pericles, Anaxagoras, and other early philosophers, of whom there were certainly no contemporary likenesses. At this time bronze was even more popular than marble as a material for busts. Various sizes were in vogue; some were more than life-size, for use in public places, others were diminutive, for chamber decoration. Founders of museums and libraries and wealthy amateurs sought to procure sets of such busts.

The portraitists of this period showed great ability in expressing the dominant traits of character without descending to realism. In this respect they differed from those other great portraitists of the ancient world, the Etruscans and Romans. The custom of these two peoples of preserving and carrying in procession the *imagines*, wax portraits of ancestors who had distinguished themselves, contributed to the popularity of portrait busts. The superb bronze Etruscan bust of the elder Brutus in the Capitoline probably antedates any of the Greek portraits, and its form of draped shoulders in place of the herm-shape was afterwards almost universally adopted. The Forums and other public places were encumbered under the Republic with marble and bronze portrait figures. Still, the busts preserved to us seem all to belong to the Imperial period, or the generation preceding it; those that represent Republican worthies being apparently not contemporary. Even the heads of the elder Scipio Africanus are of doubtful authenticity. The custom of collections of *lares* and *penates* popularized the use of busts, as did the founding of libraries, museums, and private collections. Villas, houses, and public buildings were filled with busts. There is an uninterrupted chronological series from Augustus to Julian the Apostate. The most numerous series is that of the Emperors and members of the Imperial family. The largest collection of these is at present in the Capitoline Museum; the next in the Vatican Museum in Rome. The British Museum and Louvre have some good examples. It is by means of a comparison with coins and medals that most of these can be identified with certainty, for the inscriptions on busts are not always reliable. The series of portrait busts of philosophers and poets was far less popular than before the Empire. Private collectors of busts were not unknown, as, for instance, those of M. Terentius Varro and Pomponius Atticus. The letters of Cicero and Pliny show how they were made. One such collection has fortunately been unearthed in the Villa dei Papiri at Herculaneum, belonging to a philosopher of the time of Cicero. This group, now in the Naples Museum, and mainly of bronzes, is the finest of its kind preserved from antiquity. The collector's taste was catholic. His busts begin with c.500 B.C., and the earliest are ideal heads of athletes; each century is represented with exquisite works; the ages of Polycletus, of Praxiteles, of Lysippos. The masterpieces are perhaps some large heads of royal personages of the Alexandrian Age, supposed to represent some of the Ptolemies, the so-called 'Plato,' 'Berenice,' and 'Seneca.' In the set of miniature busts, for the decoration of library or *lararium*, are a number of great philosophers and orators, some inscribed with their names.

The great period of portraiture closes with Septimius Severus and Caracalla, at the beginning of the Third Century A.D., and the decadence is then continuous to the time of Justinian in the Sixth Century, when busts ceased to be executed. It remained apparently a lost art until the Thirteenth Century. Then, curiously enough, a proto-Renaissance in southern Italy, under Frederick II., included the revival of portraiture in the form of busts, such as those of Frederick himself, and of his ministers, evidently imitated from the antique. The art of the Fifteenth Century was so thoroughly humanistic that portraiture was one of its favorite modes of expression. The permanent resurrection of the bust was then effected by Donatello, who was equally successful in his portraits of men, which were forceful, of women, which were graceful, and of children, where the real child-type was for the first time expressed in art with perfect mastery. His little busts of the Infant Christ and Saint John are among his most charming works. The Florentine School continued in this new field. Desiderio da Settignano and Mino da Fiesole were especially successful. In the Sixteenth Century the Lombard School of Portraits was more realistic, especially the branch established at Modena, which was partial to terra-cotta and colored busts. The fashion then spread to other nations, especially to France and Germany, where busts were executed in the prevalent styles, though none equal those of the Fifteenth Century, except a few of the most recent examples, especially in France.

Since the Sixteenth Century, portraiture has preferred to express itself in painting, and this part of the plastic sense has not been active. How far short ordinary modern achievement falls in this field may be judged by comparing the series of marble busts of great Italians dotted about the Pincian Gardens in Rome with any corresponding collection of ancient busts. King Ludwig I. of Bavaria gathered in his Walhalla a remarkable collection of busts.

BIBLIOGRAPHY. Several attempts have been made to publish sets of illustrations reproducing ancient busts. Such was the *Virum Illustrium Imagines* of Fulvio Orsini (Rome, 1569; Antwerp, 1606). The first scientific classification was by Visconti (q.v.) in his *Iconographie grecque* (Paris, 1811), and *Iconographie latine* (Paris, 1817). Bernouilli has given in his *Die erhaltenen Bildnisse berühmter Griechen* (Basel, 1877) a brief and very incomplete account of Greek portraits, and in his *Römische Ikonographie* (4 vols., Stuttgart, 1882-94) a far fuller reproduction of Roman portraits. The *corpus*

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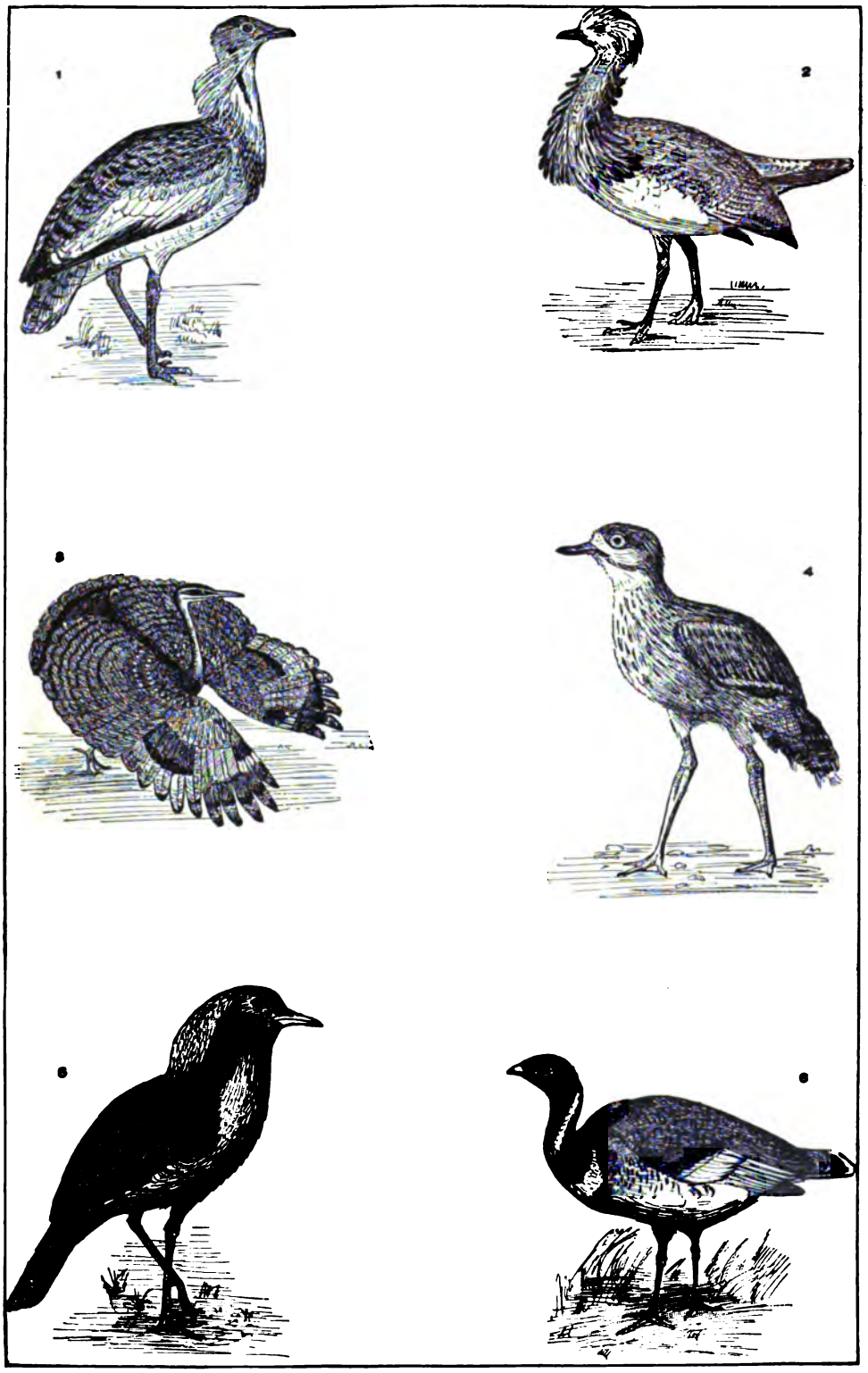
BUSTARDS



1. GREAT BUSTARD (Otis tarda).
2. HOUBARA (Otis macqueeni).
3. SUN BITTERN (Europyga helias); nuptial display.
4. THICK-KNEE OR STONE CURLEW (Œdicnemus œdicnemus).
5. KAGU (Rhinochætus jubatus).
6. LITTLE BUSTARD (Otis tetrax).

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for this subject will be Brunn and Arndt, *Griechische und römische Porträts* (Munich, 1891, et seq.), a large folio publication with fine photographs and careful descriptions. Correspondingly important for the portraits of the Italian Renaissance is Bode's folio work, also with superb photographs, *Die Denkmäler der Renaissance in Italien* (Munich, 1894).

BUSTAMANTE, bōō'stȧ-mȧn'tȧ, CARLOS MARÍA DE (1774-1848). A Mexican historian, born at Oajaca. In 1812 he commanded a regiment under Morelos in the first Mexican war for independence, and in 1821 marched with Santa Anna to the capital. From 1805 he was editor of the *Diario de Méjico.* He wrote several works of value for the study of modern Mexican history. These include *Cuadro histórico de la revolución mexicana* (2 vols., 1823; 6 vols., 1843-46); *Historia del Emperador Don Agustin de Iturbide;* and *Historia de la invasión de los Anglo-Americanos en Méjico* (1847).

BUSTAMENTE, bōō'stȧ-mȧn'tȧ, or **BUSTAMANTE,** bōō'stȧ-mȧn'tȧ, ANASTASIO (1780-1853). A Mexican politician. He was born in Tiquilpan (Michoacan), Mexico, became a physician, and joined the militia in 1808. He was among the earliest supporters of Iturbide when the revolt against Spain began in 1821. When Iturbide was overthrown in 1823, Bustamente went into retirement, but in 1829 he was chosen Vice-President of the Republic, exercising the full powers of President. He resigned when Santa Anna's revolution of 1832 proved successful, and the next year was exiled, living in Europe until 1836. After the downfall of Santa Anna, in 1836, he was recalled, and in 1837 was elected President. After a prosperous administration, he was compelled by disturbances to resign the Presidency in favor of Santa Anna in 1839 and again went to Europe, returning in 1845. He participated in the war with the United States.

BUSTAN, bōō-stȧn' (Pers. *bū,* fragrance + *stān,* place; cf. Afghani*stan,* Baluchi*stan,* Kurdi*stan,* etc). The title of a number of Persian works, the best known of which is by Sadi (q.v.). The term means literally a flower-garden, and suggests our own use of the word anthology, i.e. a collection of beautiful writings.

BUSTARD (variant of *bistard,* OF. *bistarde, oustarde,* from Lat. *avis tarda; avis,* bird, *tarda,* slow). One of the large game-birds of the Old World family Otididæ, which partakes of the characteristics of both the cranes and the plovers. They inhabit open country, being partial to the steppes of Russia and southwestern Asia, and to the plains of Africa; and are both swift runners and powerful on the wing, although the species vary in their liking for flight. The great bustard (*Otis tarda*), extinct in Great Britain, but found in open regions "from Spain to Mesopotamia," is a large bird, weighing from 25 to 30 pounds ordinarily, gay in color, with wings strongly marked with black and white, and the back, shoulders, and breast (of the male) ornamented with russet, bay, and black. It feeds mainly on leaves, buds, fruits, etc., but seems to take insects, worms, or anything edible it meets. Its flesh is tender, and it is regarded as a first-class game-bird. The little bustard (*Otis tetrax*) is a smaller and more handsome species, inhabiting both shores of the Mediterranean. The houbaras (*Otis houbara* and *Otis Macqueeni*) range from Morocco to India, and form the favorite game-birds of the Asiatic plains, where they are much hunted on camel-back, the sportsman so mounted being able to get near a flock that would take early alarm at his approach on foot. The Anglo-Indian name, 'florican,' is applied to several smaller Indian species, and those of the South African plains are called knoorhaans by the Dutch and English colonists. Australia possesses a species, but none occur in the New World, so that the distribution, as well as the ornithological affinities of these birds, is very puzzling. A structural point of interest is the presence in several species of a highly distensible gular pouch, with an opening under the tongue, concerning which much speculation has been indulged in. Stejneger is no doubt right in declaring that it is simply a secondary sexual character, for display in courtship, comparable to that of the pectoral sandpiper. Attempts to domesticate these birds have failed, although individuals may easily be tamed, from their inability to breed in confinement. Certain other birds are erroneously called bustards; as the Magellanic goose of Argentina. Consult Chapman and Buck, *Wild Africa* (London, 1893). See Plate of BUSTARDS, ETC.

BUSTARD QUAIL (Anglo-Indian). See BUTTON QUAIL.

BUSTO-ÁRSIZIO, bōō'stô är-sē'tsē-ō. A city in northern Italy, 21 miles northwest of Milan. The church, which was designed by Bramante, contains frescoes by Gaudenzio Ferrari (Map: Italy, C 2). The town has manufactures of cotton goods and a trade in wine. Population, in 1881, 13,000; in 1901, 19,673.

BUSULUK, bōō'sōōlōōk'. See BUZULUK.

BUSY, bĭz'ĭ, ZEAL-OF-THE-LAND. A caricature of the Puritan, occurring in Ben Jonson's comedy, *Bartholomew Fair.* He is a glutton and a boor, a philistine and a hypocrite. The name has since become typical of a notorious class.

BUSYBODY, THE. The *nom de plume* signed by Benjamin Franklin to a series of papers written in the manner of Addison's *Spectator.* They appeared at the time of his purchase of the *Philadelphia Gazette.*

BUSYBODY, THE. A comedy by Mrs. Centlivre, produced at Drury Lane, May 12, 1709, and published in quarto the same year. It is partially founded on Jonson's *The Devil is an Ass* and first introduces the famous character of Marplot, after which the sequel of the play, produced at Drury Lane, December 30, 1710, and printed in quarto 1711, is called. Henry Woodward produced a revision of the latter play under the title of *Marplot in Lisbon.*

BU'TADES. A Greek potter of Sicyon, probably before B.C. 600. A clay relief dedicated by him at Corinth was believed to be the first ever made. According to the legend, Butades, seeing on a wall a drawing in outline of his daughter's lover, molded the face in clay, and baked it with the tiles which it was his business to make. This raised relief, and also the relief formed by pressing in the background with a stamp, were first used to ornament the ends of roof-tiles, and later for other purposes. All this is probably Corinthian legend, and little more than the existence of the ancient relief with the name of Butades can be regarded as historical.

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BU'TANE (from Lat. *butyrum;* see BUTTER) and **I'SOBU'TANE.** Two gaseous compounds of carbon and hydrogen similar to marsh-gas. They are isomeric, i.e. they have the same molecular formula (C_4H_{10}), yet differ in their physical and chemical properties. Butane is one of the gases found dissolved in crude petroleum.

BUTCH'ER, SAMUEL HENRY (1850—). A British classical scholar. He was born in Dublin, studied at Marlborough College, and then became a fellow of Trinity College, Cambridge (1874-76), and fellow and lecturer in University College, Oxford (1876-82). He became professor of Greek at the University of Edinburgh in 1882, succeeding John Stuart Blackie. With Andrew Lang, he published an admirable prose translation of the *Odyssey* (1879). His own published works include a small volume on *Demosthenes* (1881); *Some Aspects of the Greek Genius* (1891); and *Aristotle's Theory of Poetry and the Fine Arts, with a Critical Text and Translation of the Poetics* (1895).

BUTCHER-BIRD. A shrike, so called from its habit of hanging up on thorns, fence-posts, etc., the animals it captures for food. A belief in Europe that these victims numbered nine in each place gave it the German name 'nine-killer.' See SHRIKE.

BUTE, būt (from Gael. *bwth, both,* but, dwelling, Engl. *booth,* referring to the cell of Saint Brandon). An island in the Firth of Clyde, forming, with Arran, 5 miles southwest, and some smaller islands, the County of Bute, Scotland (Map: Scotland, C 4). It is separated from the coast of Argyle by a strait less than 1 mile wide, called the Kyles of Bute. It is about 16 miles long, from 1¼ to 6¼ miles broad, with an area of 60 square miles. The surface to the north is high, rugged, and barren; in the centre and south, low and undulating, and comparatively fertile. The highest point rises 875 feet. The coast is rocky and has some bays. The island has several small lakes. The climate is milder than in any other part of Scotland, and is much resorted to by invalids. The chief town is Rothesay (q.v.). Most of the island belongs to the Marquis of Bute, whose beautiful seat, Mount Stuart, is about 4 miles south from Rothesay. Among its antiquities are Rothesay Castle, Kames Castle, Kilmorie Castle, Saint Blaine's Chapel, Dungyle, a remarkable vitrified fort on a high crag on the southwest coast, and the Devil's Cauldron, a circular erection, the original purpose of which is unknown. Bute and the neighboring isles were for many centuries subject to the Norwegians. Population, in 1891, 11,740; in 1901, 12,174.

BUTE, JOHN STUART, third Earl of (1713-92). A British statesman whom Wilkes reviled, at whom Junius thundered, and against whom Chatham declaimed as "one behind the throne greater than the throne itself." He was born in Edinburgh, May 25, 1713, and succeeded to the peerage in 1723. He was educated at Eton and early showed a taste for mathematics, mechanics, and natural science, especially botany. About 1737 he attracted the favorable notice of Frederick, Prince of Wales, who appointed him a lord of the bedchamber. After the death of the Prince he became Groom of the Stole to his son, afterwards George III., over whose mind he obtained a strong influence. In March, 1761, he became Secretary of State, and was Premier from May, 1762, to April, 1763. His Government was one of the most unpopular that ever held office in Britain, its fundamental principle being royal autocracy, with an executive government of obedient servants. In peril from mob violence, he resigned, but was always hated for his influence over the King. He devoted himself to the scientific pursuits which had early attracted him, was a liberal patron of literature and art, and left an immense library, a fine collection of astronomical and philosophical instruments, and a gallery of splendid pictures, preserved to this day. He died March 10, 1792, in his seventy-eighth year, from the effects of a fall from a cliff while botanizing.

BU'TEA (Neo-Lat., from John, Earl of Bute). A genus of plants of the order Leguminosæ. The best-known species are *Butea frondosa* and *Butea superba,* natives of India: the former are very widely diffused throughout that country, generally appearing as a sort of shrub in the neighborhood of villages, but in the jungles growing into a small tree. These trees present a gorgeous sight when covered with racemes of large, deep-scarlet flowers. They have trifoliate leaves, with roundish leaflets, velvety beneath. They yield a resinous exudation, which occurs in the form of lurid red tears, often covering the twigs, and is one of the kinds of lac brought to the market in India. *Butea frondosa* is called the Dhak or Pulas tree in India. The bark and roots are very fibrous, and the strong fibre is used for calking boats, rope-making, etc. The flowers, called teesoo or keesoo, yield a beautiful yellow or orange dye. The gum exuded by *Butea frondosa* is said to contain more than 70 per cent. tannin.

BUTESHIRE, būt'shēr. A county in the west midland division of Scotland, comprising the isles of Bute (q.v.), Arran (q.v.), and the Cumbraes, Holy Isle, Pladda, Inchmarnoch, and other smaller islands (Map: Scotland, C 4). Area of the whole, 218 square miles, of which about one-sixth is cultivated. The county town is Rothesay, in the island of Bute. Population, chiefly engaged in fishing, in 1801, 11,800; in 1851, 16,600; in 1891, 18,404; in 1901, 18,800.

BUTIN, bu'tăn', ULYSSE LOUIS AUGUST (1838-83). A French artist, born at Saint Quentin, Aisne. He studied under Picot and Pils. His works are genre subjects, usually studies of fisher folk, and the following in this manner are notable: "Les Moulières à Villerville" (1874); "Le Départ" (1881); "La Pêche," "L'Attente," "Le Cabistan" (1876), and "L'Enterrement d'un Matelot à Villerville" (1878), in the Luxembourg.

BUT'LER. A borough and county-seat of Butler County, Pa., on Conequenessing Creek, 31 miles north of Pittsburg, and on the Pennsylvania, the Pittsburg and Western, the Buffalo, Rochester and Pittsburg, and the Bessemer and Lake Erie railroads (Map: Pennsylvania, B 3). The surrounding country is rich in oil, natural gas, coal, and iron. Glass manufacture, including bottles and plate glass, is the chief industry; there are also planing-mills, flour-mills, and manufactures of silk, carriages, white lead, and oil-well tools. Extensive steel car works are in course of erection. Butler has a fine court-house and a well-equipped, though

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small, public library. Settled about 1798, Butler was first incorporated in 1803. It is governed by a burgess, elected for three years, and a borough council. Population, in 1880, 3163; in 1890, 8734; in 1900, 10,853.

BUTLER, Alban (1711-73). An English hagiographer. In 1719 he was sent to the English Roman Catholic College at Douai, where he was professor of philosophy, and afterwards of divinity. He traveled on the Continent, was chaplain to the Duke of Norfolk, and was president of the English College of Saint Omer, where he died. His great work, the *Lives of the Saints*, a kind of latter-day *Acta Sanctorum* (4 vols., 1756-59), required thirty years for its completion, and shows vast erudition and research. The second edition (with previously omitted notes) was published in twelve volumes after his death, and many editions and translations have been issued since.

BUTLER, Amos William (1860—). An American anthropologist and ornithologist, born at Brookville, Ind. He was educated at the University of Indiana, at Bloomington; was one of the founders of the Indiana Academy of Science, and in 1895 was elected its president. From 1896 to 1897 he was ornithologist to the State Department of Geology and Natural Resources of Indiana. He was secretary of the Section of Anthropology of the American Association for the Advancement of Science from 1886, of the section of biology from 1889, and general secretary of the association from 1891. In 1900 he became a vice-president of the association, in charge of the Section of Anthropology. His publications include *Notes on the Range and Habits of the Carolina Parrakeet* (1892); *Urodela — the Salamanders. Genus Cryptobranchus Leuckart* (1892), and a work on *The Birds of Indiana.*

BUTLER, Andrew Pickens (1796-1857). An American politician. He graduated at South Carolina College, and in 1817 became a lawyer. He served in the Legislature in 1824, and in 1833 was appointed judge of the Circuit and Supreme courts. In 1846 he was appointed United States Senator, and served as such until his death. It was Sumner's reply to Butler's last speech in the Senate that led to the assault upon the former by Preston S. Brooks (q.v.).

BUTLER, Benjamin Franklin (1795-1858). An American lawyer and politician. He was born at Kinderhook Landing, N. Y., received a district-school education; studied law, and was admitted to the bar in 1817. He was a partner of Martin Van Buren until 1821, and gained rapid eminence in his profession. In 1825-27 he was associated with Messrs. Duer and Spencer on the commission to revise the statute laws of the State, and with them carried through the work in such a way as to win the enthusiastic praise of the New York bar. He was elected to the State Legislature in 1827, was the representative of New York on the commission which, in 1833, readjusted the New York-New Jersey boundary; was Attorney-General in the Cabinet of Jackson from 1833 to 1837, and in that of Van Buren from 1837 to 1838; and from October, 1836, to March 4, 1837, acted also as Secretary of War. From 1838 to 1841 he was district attorney for the United States at New York City; in 1844 he was at the head of the Electoral College in New York; and from 1845 to 1848 he was again district attorney, having declined the position of Secretary of War in President Polk's Cabinet. He organized the department of law in the College of the City of New York, and for some time was the principal professor. After 1848 he devoted himself wholly to his private practice, and was engaged in several notable cases; but in 1858, owing to failing health, he visited Europe, and on November 8 died in Paris. As a lawyer he was recognized as one of the foremost members of the New York bar, and practiced on equal terms with such men as Van Buren, Henry, Duer, Spencer, and Nelson. Chancellor Kent once said of him: "The student, in pursuing his studies, is surprised to find in all his books such vast and various memoranda of the professional labors of this remarkable lawyer." In politics he was for the greater part of his life an enthusiastic Democrat, but, disapproving of his party's attitude toward the Kansas-Nebraska Bill and the repeal of the Missouri Compromise, he joined the newly organized Republican Party in 1856 and voted for Frémont. A number of addresses delivered by him before the New York Historical Society were published under the title *Outlines of the Constitutional History of New York* (1847). For a biographical sketch, consult *Proceedings and Addresses on the Occasion of the Death of Benjamin F. Butler* (New York, 1859).

BUTLER, Benjamin Franklin (1818-93). An American lawyer, politician, and general. He was born in Deerfield, N. H., November 5, 1818; graduated at Waterville College (now Colby University), Maine, in 1838; was admitted to the bar in 1840, and began at Lowell, Mass., a practice which soon became large and gave him a wide professional repute. He entered political life as a Democrat, was sent in 1853 to the State Constitutional Convention and to the State Legislature, where he was instrumental in effecting the passage of a bill for reducing the hours of labor in factories from thirteen to eleven, and in 1859 was elected to the State Senate. He was a delegate to the National Democratic Convention at Charleston, S. C., in 1860, and to the subsequent convention at Baltimore, and was among those who withdrew from the latter. In the same year he was an unsuccessful candidate for Governor of Massachusetts. Upon the outbreak of the Civil War he was a brigadier-general of the State militia. After taking possession of Annapolis he occupied Baltimore without opposition, and in May, 1861, was made a major-general of volunteers and put in command of the Department of Eastern Virginia, with headquarters at Fortress Monroe. While here he refused to surrender fugitive slaves who penetrated his lines, and in this connection issued his famous order designating slaves as 'contraband of war.' After taking some part in the operations against the coast forts of North Carolina, he was sent, in the following spring, to Ship Island and up the Mississippi. When the expedition against New Orleans was organized he was placed in command of the troops, and on May 1, 1862, after Farragut had run by Forts Jackson and Saint Philip, and had destroyed the Confederate fleet, Butler took possession of New Orleans, and in-

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stituted a vigorous administration which, though characterized by great ability and for the most part by good judgment, was warmly criticised. Especial notoriety attached to his "Order No. 28," issued after considerable provocation, in which he directed that any woman who should publicly insult United States officers should be "regarded and held liable to be treated as a woman of the town plying her avocation." The order aroused the intense anger of the South, and for this and other acts during his administration, President Jefferson Davis in December ordered by proclamation that Butler should be considered as a felon and an outlaw, and if captured should instantly be hung. Butler's order also caused much indignation abroad, and especially in England, and for some time threatened seriously to compromise the relations between the British and American Governments. Butler was relieved from his post by Gen. N. P. Banks (q.v.), in December, 1862, and toward the close of 1863 was made commander of the Department of Virginia and North Carolina, in which capacity, after being hemmed in for some time at Bermuda Hundred (q.v.), he coöperated in Grant's general movement against Petersburg. In October, 1864, he was temporarily put in command at New York City, in view of anticipated disturbances during the approaching election, and in the following December commanded an expedition against Fort Fisher. His conduct during this movement led to his removal by Grant, whose orders he had disregarded, and to the ending of his military career. Devoting himself thereafter to law and politics, he was elected to Congress as a Republican in 1866, remained a member during ten of the following twelve years, took an active part in the debates over the various Reconstruction measures, and was one of the seven managers, for the House, of the impeachment trial of President Andrew Johnson. In 1871 he was the Republican nominee for Governor of Massachusetts, but was defeated. Having left the Republican Party and allied himself with the Greenback and Labor movement, he became an independent Democratic candidate for Governor in 1878, and again in 1879, but was each time defeated. He acted regularly with the Democrats in the campaign of 1880, and was finally elected Governor by that party in 1882. In the following year he was defeated for the same office, and in 1884, refusing to be bound by the action of the Democratic National Convention, of which he had been a member, he accepted a Presidential nomination from the Greenback-Labor and Anti-Monopolist parties; but was defeated in the ensuing election. He died suddenly at Washington, January 11, 1893. He published *The Autobiography and Personal Reminiscences of Major-General B. F. Butler: Butler's Book* (1892). Consult: Parton, *Butler in New Orleans* (New York, 1863); and Bland, *Life of Benjamin F. Butler* (Boston, 1879).

BUTLER, Charles (1750-1832). A prolific English writer, nephew of Alban Butler (q.v.). He was educated at Douai, was entered at Lincoln's Inn in 1775, and first practiced as a conveyancer, but was regularly called to the bar in 1791, when the disability under which the Roman Catholics suffered was removed. Throughout his life he labored earnestly for the repeal of the law against English Catholics. His literary activity was enormous. Among his works were lives of Erasmus, Grotius, Fénelon, Bossuet, Alban Butler, and others. He also published a continuation of his uncle's *Lives of the Saints*, and completed Hargrave's edition of *Coke upon Littleton*.

BUTLER, Charles (1802-97). An American lawyer and philanthropist. He was born at Kinderhook Landing, Columbia County, N. Y.; studied law in the office of Martin Van Buren at Albany, N. Y.; was admitted to the bar in 1824; became assistant district attorney of Genesee County; and as agent of the New York Life Insurance and Trust Company, was influential in building up the western part of the State. He obtained extensive interests in land on the site of the present cities of Chicago, Ill., and Toledo, Ohio, and by this means, by large railway investments, and by his adjustment of the State debts of Indiana, Michigan, and Illinois, accumulated a fortune. In 1835 he was a founder of the Union Theological Seminary, New York City, and in 1836 was appointed to the council of New York University, of which he was long president.

BUTLER, Clement Moore (1810-90). A Protestant Episcopal clergyman, born in Troy, N. Y. He graduated at Trinity College in 1833, and at the General Theological Seminary in 1836, and was rector of churches in Boston and Washington, and, from 1862 to 1864, of Grace Church, Rome, Italy. For the next twenty years he was professor of ecclesiastical history in the Protestant Episcopal Theological School, Philadelphia. He published: *The Book of Common Prayer Interpreted by Its History* (1846): *Old Truths and New Errors* (1850); *Saint Paul in Rome* (1865); *Inner Rome* (1866); and *Manual of Ecclesiastical History* (2 vols., 1868-72).

BUTLER, Henry Montague (1833—). An English clergyman and educator, born at Gayton, Northamptonshire. He studied at Trinity College, Cambridge, and was headmaster of Harrow School from 1859 to 1885. In 1885-86 he was Dean of Gloucester, and in 1897 was appointed honorary Canon of Ely. He became master of Trinity College, Cambridge, in 1886, and vice-chancellor in 1889 and 1890. His published works, consisting chiefly of volumes of sermons, include: *Sermons Preached in the Chapel of Harrow School* (1861; a second series in 1866); *Belief in Christ, and Other Sermons* (1898); *Words of Good Cheer for the Holy Communion* (1898); and *University and Other Sermons* (1899).

BUTLER, Howard Russell, N.A. (1856—). An American landscape and marine painter, and also a lawyer. He was born in New York, March 3, 1856, graduated at Princeton College, 1876, and at the Columbia Law School, 1881. He studied painting at the Art Students' League in New York, and in Paris. His pictures are painted with direct reference to nature, good in color, and vivid as impressions of the scene. It was largely through his instrumentality that the structure which is the home of the Fine Arts Society, of which he was the first president, was built.

BUTLER, James. See Ormond.

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BUTLER, JAMES GLENTWORTH (1821—). An American clergyman of the Presbyterian Church. He was born in Brooklyn, N. Y., studied at Yale, the Union Theological Seminary, and Yale Divinity School, and from 1852 to 1868 was pastor in West Philadelphia, Pa. From 1868 to 1871 he was secretary to the American and Foreign Christian Union of New York City, and from 1871 to 1873 was pastor in Brooklyn, N. Y., Eastern District. Subsequent to 1874 he was occupied wholly with literary work, in particular with the preparation of his commentary, *Bible Work* (Vol. I., 1878; Vol. VIII., 1893, incomplete). He also published *The Fourfold Gospel* (1890).

BUTLER, JOHN (? -1794). A Tory leader in the American Revolution. He was born in Connecticut, but early became a resident of Tryon County, N. Y. He commanded the Indians in Sir William Johnson's Niagara campaign of 1759, and in the Montreal expedition of 1760; joined the British at the beginning of the Revolution, and led many Indian and Tory expeditions against the frontier settlements, making himself notorious by his numerous cruelties and atrocities. At the battle of Oriskany (q.v.), in 1777, he commanded a company of Indians and Tories organized by himself, and in 1778 led the force of 1100 which devastated the Wyoming Valley and massacred the inhabitants. (See WYOMING VALLEY.) He fought against Sullivan in 1779, when that officer made his famous expedition against the Iroquois in New York, and the following year engaged in Sir John Johnson's raid against the Schoharie and Mohawk settlements. At the close of the war he settled in Canada, where, until his death, he was an agent for Indian affairs.

BUTLER, JOSEPH (1692-1752). An English theologian, born at Wantage, in Berkshire. With a view to the ministry of the Presbyterian Church, he attended a Dissenting academy at Tewkesbury, in Gloucestershire. At the age of 22 he gave proof of high metaphysical ability in a letter to Dr. Samuel Clarke, usually appended to that celebrated writer's *a priori* demonstration, to which it offers some objections. About this time he made up his mind to join the Church of England, and in March, 1714, entered Oriel College, Oxford. In 1718 he graduated, took orders, and was appointed preacher at the Rolls Chapel, where he preached those remarkable sermons which he published in 1726. The first three, "On Human Nature," constitute very important contributions to moral science. Against hedonism (q.v.) he urges that before one can find pleasure in an object one must have a disinterested desire for the object. Hence, disinterested benevolence is possible. Indeed, it is one among many impulses of human nature, which is a system of impulses, each having its own right. Butler sometimes represents conscience as the supreme regulative principle, controlling all the other impulses; sometimes reasonable self-love and benevolence are coördinate and harmonious supreme principles; sometimes to self-love is attributed the final word in the (for him impossible) case of a conflict between self-love and benevolence. Just what conscience is for Butler it is hard to ascertain. In 1725 Butler was presented to the rich benefice of Stanhope in the county of Durham, to which he removed in the following year. Here he resided in great retirement till 1733. Thomas Secker, afterwards archbishop, desired to see him promoted to some more important position, and mentioned his name once to Queen Caroline. The Queen thought he had been dead, and asked Archbishop Blackburne if it were not so. "No, madam," said the Archbishop, "but he is buried." In 1733 Butler became chaplain to his friend, Lord Chancellor Talbot, and some time afterwards a prebendary of Rochester. In 1736 he published *The Analogy of Religion, Natural and Revealed, to the Constitution and Course of Nature.* Although the argument is ingenious, and for a century and a half has been praised in the highest terms, it cannot be said to have any logical value. The leading aim of the *Analogy* is to show that all the objections to revealed religion are equally applicable to the whole constitution of nature, and that the general analogy between the principles of divine government, as revealed in the Scriptures, and those manifested in the course of nature, warrants the conclusion that they have one Author. Soon after the publication of this work, Butler was appointed Clerk of the Closet to the Queen, who greatly prized his conversation. In 1738 he was made Bishop of Bristol; in 1740, Dean of Saint Paul's; and in 1750 he was translated to the see of Durham. He lived to make but one visitation of his diocese. His 'charge' on the occasion, in which he emphasized the importance of a due maintenance of the externals of religion, subjected him to much censure as betraying a tendency to Roman Catholicism. In character Butler was grave and judicious, meek and generous. His intercourse with his clergy and people was frank and humane, and his episcopal treasures were wisely and munificently distributed. His works, with a *Life* by Kippis and notes by Halifax, were collected and published at Edinburgh (1804), and reprinted at Oxford (1807); a sumptuous edition, with 'studies,' was published by W. E. Gladstone in 1896. There are good separate editions of the *Analogy* and of the *Three Sermons.* Consult: Collins, *Butler* (London, 1889); Lefevre, "Significance of Butler's View of Human Nature," in *Philosophical Review* for 1899.

BUTLER, MATTHEW CALBRAITH (1836—). An American soldier and politician. He was born in South Carolina, and spent two years at the State University. He entered the Confederate Army as a captain, in 1861, and attained the rank of brigadier-general in 1862 and of major-general in 1863. In 1863, at the battle of Brandy Station, he lost his right leg. He was elected to the State Legislature in 1866, was a candidate for Lieutenant-Governor of South Carolina in 1870, and from 1877 to 1889 was a Democratic member of the United States Senate. In 1898 he was appointed major-general of volunteers for service in the Spanish-American War, and in the same year was a member of the commission appointed to arrange for the evacuation of Cuba by the Spanish forces.

BUTLER, NICHOLAS MURRAY (1862—). An American educator. He was born in Elizabeth, N. J., graduated at Columbia in 1882, and was

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fellow in philosophy there from 1882 to 1884. He then spent a year in study in Berlin and Paris; returned to Columbia University as assistant in philosophy in 1885; and, after holding various minor positions there, became professor of philosophy, ethics, and psychology, and first dean of the faculty of philosophy in 1890. In 1887 he organized and became the first president of the New York College for the Training of Teachers (now Teachers College, Columbia University). In 1891 he founded the *Educational Review*, of which he has since been editor; and, in addition, he has edited the *Great Educators Series;* the *Teachers' Professional Library;* and the *Columbia University Contributions to Philosophy and Education.* In 1894 he was elected president of the National Educational Association, and on the resignation of Seth Low from the presidency of Columbia in 1901, he became acting president, and soon afterwards was regularly chosen as president of the university. He is the author of a great many addresses, papers, essays, and reviews, some of which have been collected in a volume, under the title, *The Meaning of Education* (1898).

BUTLER, Pierce Mason (1798-1847). An American soldier and politician. He was born in South Carolina, entered the army as second lieutenant of infantry in 1819, and became captain in 1825. He resigned his commission in 1829, and was president of a bank in Columbia, S. C., from 1829 to 1836, but served as lieutenant-colonel during the second Seminole War. He became Governor of the State in 1838, and after the expiration of his term was Indian agent until the beginning of the Mexican War. He then was appointed colonel of the Palmetto Regiment, and in this capacity served with great gallantry in several engagements, but was killed at the battle of Churubusco, August 20, 1847.

BUTLER, Reuben. The husband of Jeanie Deans, in Scott's novel, *The Heart of Midlothian;* a Scotch minister and 'a puir creetur.'

BUTLER, Samuel (1612-80). An English satirist. He was baptized at Strensham, Worcestershire, February 8, 1612, and educated at the Worcester Grammar School. It is a tradition that he also attended one of the universities, most likely Cambridge. When a young man he entered the household of the Countess of Kent, where he became acquainted with Selden. He also studied painting at this time. Leaving the service of the Countess, he became attendant to a succession of country gentlemen. During this period he wrote much of *Hudibras*, the hero of the poem being one of his masters—Sir Samuel Luke, of Cople Hoo, near Bedford. In 1660 he was made secretary to the Earl of Carbery, who appointed him steward of Ludlow Castle. Soon after he married a woman of good family and some property, which, however, was lost in bad securities. He published the first part of *Hudibras* in 1663, and its reception at Court was immediate and triumphant. Then the coffee-houses and taverns took up the poem. Though the King had wit enough to see the merit of the work, he lacked generosity to relieve the necessities of the writer. Poverty is almost the only thing in Butler's life that one is certain of. In 1664 he publisher the second part of his book, and a third part appeared in 1678. He died in Rose Street, Covent Garden, September 25, 1680.

Hudibras is a kind of metrical *Don Quixote*. The Puritans are the subject of ridicule, and King Charles must have felt that the poet avenged for him the battle of Worcester. Butler thinks in witty couplets, he argues in them, he spears his foes with a jest, he routs and chases them into oblivion with inextinguishable laughter. His best things have become proverbs. In 1759 appeared *The Genuine Remains, in Prose and Verse, of S. Butler* (London), which contains a series of character sketches and much brilliant satire in the manner of *Hudibras*. Consult: The new edition of *Hudibras*, in Morley's Universal Library (London, 1894); and *Poetical Works*, edited by Johnson (London and New York, 1893).

BUTLER, Walter (? -1634). An Irish soldier in the Austrian service. He rose to be a colonel of dragoons in the army of Wallenstein, in whose murder he was an accomplice. (See Wallenstein.) Subsequently he distinguished himself at Nördlingen. He appears in Schiller's *Wallenstein*.

BUTLER, William Allen (1852—). An American lawyer and satirical poet. He was born in Albany, N. Y., February 20, 1825, the son of Benjamin F. Butler (1795-1858), a prominent New York lawyer and politician. He studied law in his father's office, and became a successful lawyer, finding time, however, to contribute papers and poems to various magazines. He is best known for his satire entitled "Nothing to Wear," published anonymously in *Harper's Weekly* in 1857. This was widely circulated and was translated into French and German. It has recently (1899) been republished, with others of his poems. Mr. Butler first collected his poems in 1871; he has also written quite a number of prose works, among them a sketch of Martin Van Buren (1862); and *Domesticus*, a story dealing with the labor question (1886).

BUTLER, William Archer (c.1814-48). An Irish moral philosopher and clergyman of the Established Church. He was born at Annervel, and was at first educated as a Roman Catholic, but became a Protestant, and graduted at Trinity College, Dublin, where he was subsequently scholar in 1834-36. In 1837 he was appointed professor of moral philosophy at Trinity College, and having been at about the same time ordained as a clergyman, received the prebend of Clondehorka, and in 1842 the rectorship of Raymoghy. His best-known works are the *Sermons Doctrinal and Practical* (1849), and the eloquent *Lectures on the History of Ancient Philosophy* (1856).

BUTLER, Sir William Francis (1837—). A British soldier, born in County Tipperary, Ireland. He was privately educated, entered the army, and rose to be lieutenant-colonel in 1880. He served in the Ashanti War (1870), the Zulu War (1879), and the war in the Sudan (1884-85), and commanded the English troops at Alexandria in 1890-93. In 1898 he was in command of the army in South Africa, and, in 1899-1900, of the troops of the Western District. He was promoted in 1900 to be lieutenant-general, and was appointed commanding officer at Alder-

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shot. He has published *The Great Lone Land* (1872); *Far and Out* (1880); *Charles George Gordon* (1889); a life of *Sir George Pomeroy Colley* (1899); and other works.

BUTLER, WILLIAM MORRIS (1850—). An American physician. He was born at Maine, N. Y., studied at Hamilton College and the New York College of Physicians and Surgeons, and in 1874 became connected with the State Homœopathic Hospital at Middletown, N. Y. In 1883 he began practice in Brooklyn, N. Y., where he was appointed visiting physician of the Homœopathic Hospital and consulting physician of the Memorial Hospital. He became, also, professor of mental and nervous diseases in the Metropolitan Postgraduate School of Medicine, New York City. His publications include *Home Care for the Insane.*

BUTLER, WILLIAM ORLANDO (1791-1880). An American soldier and politician. He was born in Jessamine County, Ky.; early removed with his parents to Bullitt County; and in 1812 graduated at Transylvania University. On the outbreak of the War of 1812 he joined a company of Kentucky volunteers, and subsequently participated in the engagements of January 18 and January 22, 1813, on the river Raisin. (See FRENCHTOWN.) He was held for some time as a captive, but afterwards took an active part, as captain, in the engagement at Pensacola, in that of December 23, 1814, at New Orleans (for which he was brevetted major), and in the famous battle of New Orleans, on January 8, 1815. In May, 1817, he resigned from the service and returned to Kentucky, where he became a successful lawyer and politician. He served for three consecutive terms after 1817 in the State Legislature, and from 1839 to 1843 was a member of Congress. In 1844 he was Democratic candidate for Governor of the State, and, though defeated, reduced the Whig majority from 28,000 to something over 4000. He was appointed major-general of volunteers in June, 1846, for service in the Mexican War; joined General Taylor soon afterwards; took a prominent part in the northern campaign, distinguishing himself particularly at Monterey, where he was wounded; joined General Scott at Mexico City, with a considerable reinforcement; and participated in the final operations of the southern campaign. On February 18, 1848, nine days after the signing of the preliminary treaty with Mexico, and about three months before the proclamation of peace (on May 29), he superseded Scott as commanding general of the American Army. On August 15, 1848, he again left the service, and in the Presidential campaign of that year he was the Democratic candidate for Vice-President on the ticket with General Cass. Subsequently, until his death, he lived almost wholly in retirement, though in 1861 he attended the celebrated 'Peace Conference' at Washington. He published a collection of poems entitled, *The Boatman's Horn, and Other Poems.* For his life, consult Blair, *The Life and Public Services of General William O. Butler* (Baltimore, 1848).

BUTLER, ZEBULON (1731-95). An American soldier. He was born in Connecticut, served in the French and Indian War of 1755-63, and settled at Wyoming, Pa., in 1769. He was lieutenant-colonel of the Connecticut troops in New Jersey in 1777-78, commanded the garrison of Forty Fort at the time of the Wyoming massacre (see WYOMING VALLEY), and in 1779 served in Sullivan's expedition against the Indians.

BUTLEROFF, bōōt'lēr-ôf, ALEXANDER MIKHAILOVICH (1825-86). A Russian chemist. He was born at Tchistopol (Government of Kazan) and was educated at the University of Kazan, where, in 1858, he was appointed professor of chemistry. He also held the position of rector at that institution. In 1868 he was called in the same capacity to the University of Saint Petersburg. Besides publishing a valuable work on the general principles of organic chemistry, Butleroff carried out a number of interesting original investigations. His best-known contribution to science was the discovery of the so-called tertiary alcohols (see ALCOHOLS), and of a general method by which the substances of this class may be readily prepared ('Butleroff's reaction'). His scientific papers may be found in the publications of the academies of Saint Petersburg and Paris, and in Liebig's *Annalen.* Butleroff was a strong believer in spiritualism, and even published a work in French on this subject, entitled *Etudes psychiques.*

BU'TO (Gk. Βουτώ, *Boutō*). The Greek form of the Egyptian *Pe(r)-Uzoy(t)* (House of Uzoyt), the name of a city which, in prehistoric times, seems to have been the capital of Lower Egypt. The goddess Uzoyt, from whom the city took its name, was the patroness of the Delta. She is represented in the form of a serpent, and was identified by the Greeks with Latona. The city of Buto appears to have been situated on an island of the modern Lake Burlos, but the exact location is unknown.

BUTON, bōō'ton, **BOETON,** or **BUTUNG.** An island of the Dutch East Indies, situated southeast of Celebes, from which it is separated by Buton Strait. It is included between latitudes 4° 25′ and 5° 45′ S. and longitudes 122° 32′ and 123° 30′ E. Area, about 1700 square miles. It has an elevated surface and is fertile and thickly wooded. It is an administrative dependency of Celebes, but is governed by a native chief under a Dutch resident. The chief town is Buton, at the southwest extremity of the island. Population, estimated at 100,000, chiefly Malays.

BÜTSCHLI, but'shlē, OTTO (1848—). A German zoölogist, born in Frankfort-on-the-Main. He studied at the Karlsruhe Technical School and at the University of Heidelberg, became a lecturer at the former (1876-78), and in 1878 was appointed professor of zoölogy at the latter. His early researches concerned the history of the evolution of gasteropods, worms, and insects, and the anatomical structure of the nematodes and other worms. In his "Studien über die Zellteilung und die Konjugation der Infusorien" (in Vol. X. of the *Abhandlungen* of the Sneckenberg Society, 1876), he was a pioneer in establishing modern scientific knowledge of nucleus and cell division. His studies of the constitution of protoplasm and the structure of bacteria have aroused wide scientific interest and discussion. His publications include an important volume on the "Protozoen" (constituting Vol. I. of Bronn's *Klassen und Ordnungen des Tierreichs,* 1880-89); *Untersuchungen über mikroskopische Schäume und das Protoplasma*

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(1892); and *Untersuchungen über die Mikrostruktur künstlicher und natürlicher Kieselsäuregallerten* (1900).

BUTT, Isaac (1813-79). An Irish politician. He graduated at Trinity College, Dublin, in 1835; was professor of political economy there from 1836 to 1841, and became a member of the Irish bar. He was one of the counsel for Smith O'Brien and others tried in 1848 for treason, and also for the Fenians tried in 1865. In 1852 he was chosen to Parliament from Youghal as a Liberal Conservative; and in 1871 was returned from Limerick, and was for many years leader of the Home Rule Party. He was one of the projectors of the *Dublin University Magazine*, of which he was editor from 1834 to 1838. Among his published works are a *History of Italy* (1860), and *The Problem of Irish Education* (1875).

BUTTE, bût (Fr., mound, hillock, elevation; cf. Engl. *butt*). A hill or knoll rising abruptly above the surrounding level. Buttes abound in the Rocky Mountain region. Often the name is applied to high mountains, as the Downieville Buttes, Sierra County, Cal., which are over 8500 feet.

BUTTE. A city and county-seat of Silverbow County, Mont., on the western slope of a range of the Rocky Mountains, and on the Oregon Short Line, the Northern Pacific, the Great Northern, and the Montana Union (owned by the Northern Pacific) railroads (Map: Montana, C 2). It has a healthful location at an altitude of 5800 feet, is the seat of the State School of Mines, and contains a fine public fountain, a public library of about 30,000 volumes, a private academy, and, among the more notable buildings, the jail and court-house, the high school, completed at a cost of $125,000, city hall, and opera house. The famous Anaconda Copper and Silver Mine is located here, and within a radius of a few miles are many other productive gold, silver, and copper deposits, the industries of the city centring almost entirely in the mines. In copper, the production of Butte is placed at about one-half of the entire output of the United States, and the amount of gold and silver mined is also considerable, the value of the annual production of these three minerals being estimated at nearly $50,000,000. Besides the mines, there are immense mills and smelting-works. The government is vested in a mayor, biennially elected, and a city council. Butte spends annually in maintenance and operation over $500,000 (including amounts for the school district extending beyond the municipal limits); the principal items of expenditure being about $190,000 for schools, the district, as above stated, comprising more than the city limits, $60,000 for the fire department, $55,000 for the police department, $40,000 for street cleaning and sprinkling, and $20,000 for municipal lighting. Butte was settled in 1864, and laid out in 1866, but its prosperity dates from the successful operations in quartz mining in 1875. It was incorporated first in 1879 by an act of the Territorial Legislature, and in 1888 was reincorporated. In 1881, upon the creation of the county, Butte was chosen the county-seat. Population, in 1870, about 350; in 1880, 3363; in 1890, 10,723; in 1900, 30,470.

BUTTER (Lat. *butyrum*, Gk. [from Scythian, probably] βούτυρον, *boutyron*, from βοῦς, *bous*, cow + τυρός, *tyros*, *cheese*). A substance made from the fat of milk or cream by churning and working to separate the water and other constituents. It has been known since a period prior to the beginning of the Christian Era, being used as food to some slight extent in early days, but mostly as a medicine and as an ointment after bathing, and sometimes for burning in lamps in the place of oil. The Greeks probably derived their knowledge of it from the Scythians or Thracians, and the Romans from the Germans. Butter was first made from the milk of sheep and goats, and later from that of cows. It was churned in a very crude manner in skin bags or pouches and was evidently a very inferior article. It was not solid, but liquid, and is always spoken of as being poured out. The manufacture and use of butter as a staple article of food is comparatively recent, and in southern Europe it is still sparingly used, being replaced in great measure by olive and other oils. In the art of butter-making the Danes have long occupied a foremost place, and Danish butter brings at present a higher average price than that made in any other country. Denmark has become the leading butter-exporting country of the world, surpassing France, which formerly led in this respect. The exports of Danish butter in 1899 reached 160,143,255 pounds, valued at $34,575,634. In the United States the production of butter has made rapid growth since the introduction of the creamery system, and a product of high quality is now made. According to the statistics of the United States Department of Agriculture, the amount produced in 1899 was 1,430,000,000 pounds, valued at $257,400,000.

Butter may contain a small quantity of salt added to make it more palatable and to aid the keeping qualities, or it may be fresh (unsalted), as demanded by the taste of the consumers. Unsalted or slightly salted butter is consumed largely in England and in some parts of Europe, and the European countries in general salt their butter to a less degree than is customary in America. The natural color of butter is a golden yellow, varying in intensity with the feed, the animal, and the stage of lactation. To make the color more uniform throughout the year, a little coloring matter is commonly added in the making, usually some artificial butter-color (q.v.). The demand of different markets varies considerably in regard to the shade of color desired. Some South American countries prefer a deep orange or red color, and butter prepared for export to those countries is colored in accordance with this taste. The other qualities taken into account in judging butter are the flavor, texture or grain, and the 'finish' or general appearance. The flavor usually counts 40 or 45 points on a scale of 100. It is largely a matter of individual judgment, the high flavor preferred by some verging on rancidity, while others prefer a mild, delicate flavor. The characteristic flavor should be well pronounced, and there should be an absence of rancidity or any extraneous flavors. The texture is the appearance when the mass of butter is broken in two or when a knife or trier is passed through it. Under this term is also implied the hardness or firmness.

The composition of butter varies considerably with the process and the conditions of manufacture. According to the most reliable data available it may be said to be approximately as fol-

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THE OLD WAY.

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lows: Water, 11 per cent.; fat, 85 per cent.; protein (curd), 1 per cent.; and ash (mostly salt), 3 per cent. The average of over 350 butter analyses made during the World's Fair Dairy Test at Chicago was: Water, 11.57; fat, 84.7; curd, 0.95; and salt, 2.78 per cent. By far the most variable constituent is water, and its proportion very largely determines the percentage of fat in butter. The water content is quite largely within the control of the maker. It may run as high as 20 or 25 per cent., and even to 45 or 50 per cent. in very exceptional cases. In such cases, however, it has either been intentionally incorporated, or left there through carelessness, and is in the nature of an adulteration. There seems no good reason why, with proper making, butter should contain over 15 per cent. of water or less than 80 per cent. of fat, and this has been accepted as a standard in some places.

The most common adulterant of butter is, of course, oleomargarine (q.v.). Unfortunately, the detection of this with absolute certainty is a difficult matter, especially when the proportion is not large. This is on account of the variations in the volatile, fatty acids, in the saponification equivalent, and in other factors of normal butter, due to the feed, to the breed of cows, and to the stage of lactation. The extent to which adulteration is practiced has thoroughly aroused the dairymen, and it is responsible for the agitation against oleomargarine as a food product. Cottonseed and other oils have been used for adulterating butter, and attention has recently been called to the use of glucose as an adulterant of butter put up for export to South America, the makers claiming that the glucose was added as a preservative. A variety of preservatives have been used in butter, especially in inferior butter or in that intended for long shipment. The most usual are mixtures of borax and boric acid. Such preservatives are usually regarded as adulterants.

'*Renovated*' or 'process' butter is butter of inferior quality which has been treated by mechanical and chemical processes to remove the disagreeable taste and odors, and to eliminate its rancidity, and then incorporated with a quantity of milk or cream to give the mass a semblance of grain and flavor. A great deal of poor country butter is worked over in this way, and considerable of this is sold as good creamery butter, of which it is a fair imitation while fresh. Although it does not contain any excessive amounts of water or curd, it may well be doubted from its history whether as a food product it is as good as average butterine or oleomargarine.

Food Value. Butter is used as an article of diet, as a fat for frying, and as one of the ingredients of a large number of foods. Like other edible fats, it is a source of energy in the diet. Of the 0.17 to 0.33 pound of fat required per man per day, according to the amount of work performed, a considerable part may be furnished by butter, since experience has demonstrated that no fat is more wholesome. In 185 American dietary studies, it was found that butter furnished, on the average, 1.9 per cent. of the total food and 19.7 per cent. of the total fat of the daily food.

Butter is very thoroughly assimilated, the coefficient of digestibility of butter-fat being 98 per cent. or over.

Fresh and salt butter are equally wholesome. Clarified butter is used for a number of culinary purposes. It is prepared by heating the butter until all frothing and deposition of casein has ceased, and the liquid has become clear and free from water. The butter made in India from sour milk and called *ghee* (q.v.) is often clarified.

BUTTER, Artificial. See Oleomargarine.

BUTTER-AND-EGGS. See Toadflax.

BUTTERBUR. See Tussilago.

BUTTER-COLOR. An artificial preparation used for coloring butter and imitation products, to give them the desired golden-yellow hue. Butter is colored to give the product a more uniform appearance throughout the season, and when butter from a number of factories or dairies is 'blended' it is necessary to color it to prevent its being streaked. There are a variety of butter-colors on the market. Annatto was formerly the active principle of most of them, but of late it has been replaced to some extent by coal-tar colors, such as anilin yellow and butter yellow. Other coloring matters occasionally employed are turmeric, saffron, marigold-leaves, carrot-juice, and chrome yellow. The coloring matter is usually dissolved in some oil. The preparations are usually of such strength as to require the addition of only small quantities to the cream to produce butter of the desired color. Experiments have indicated that in the small proportions in which they are present in butter, they are generally entirely harmless.

BUTTERCUP. See Ranunculus.

BUTTERFIELD, Daniel (1831-1901). An American soldier. He was born in Utica, N. Y., graduated at Union College in 1849, and subsequently engaged in the transportation and express business. In April, 1861, he entered the Federal Army as colonel of the Twelfth New York Militia, and soon afterwards commanded a brigade in Patterson's ineffective campaign in Virginia. He was raised to the rank of brigadier-general of volunteers in October, 1861, and commanded a brigade in the Fifth Corps of the Army of the Potomac during the Peninsular campaign. He took part in nearly all the engagements, was wounded at Gaines's Mill, and in the second battle of Bull Run commanded a division under Pope. In November, 1862, he was appointed major-general of volunteers. He commanded the Fifth Army Corps at Fredericksburg, and at Chancellorsville and Gettysburg was chief of staff under Hooker and Meade respectively. In October, 1863, he joined the Army of the Cumberland, and, as chief of staff to Hooker, participated in the battle of Chattanooga. He then commanded a division of the Twentieth Corps in Sherman's Georgia campaign, and at the close of the war was brevetted brigadier-general and major-general in the United States Army for "gallant and meritorious conduct in the field." He was in command at New York City from 1866 to 1869, when he resigned from the service; and from 1869 to 1870 was United States subtreasurer there. In 1889 he organized and commanded the great Washington centennial parade in New York City, in which over 100,000 men participated. He wrote: *A System of Calls, Picket and Outpost Duty, Corps Badges and Flags* (1862).

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BUTTERFISH (for origin of name see below). Any of several fishes. The best known is a blenny (*Murænoides gunnellus*), about 12 inches long, olive-brown in color, with obscure bars and spots, called also 'gunnell' and 'rock-eel.' It is abundant in the North Atlantic. (See GUNNELL.) In New York and Massachusetts the name applies to one of the harvest-fishes of the Stromateidæ, allied to the mackerels. It is oval, about 10 inches long, bluish above and silvery below, and known to science as *Rhombus triacanthus*. It owes its name to the butter-like feeling of its surface, and it is highly esteemed as food. Lafayette, harvest-fish (referring to the time of its appearance), and dollar-fish (due to its roundish form and silvery hue), are other local names. Similar species belong to the northwest coast. A third 'butterfish' is a small yellow or reddish serranid (*Epinephelus punctatus*) of Florida and the West Indies—one of the groupers (q.v.); and a fourth is a popular longfin (*Chilodactylus nigricans*). See LONGFIN; HARVEST-FISH.

BUTTERFLIES and **MOTHS** (the name is probably due to the popular belief that it steals butter and milk; or it may refer to the color of the excrement; cf. M. Dutch *boterschijte, schete*). Insects of the order Lepidoptera which are not separable by any distinct line of structural characters. (See LEPIDOPTERA.) They agree in essentials and their popular separation is a practical rather than a natural one. Perhaps the nearest we may come to a definite distinction is to call *butterflies* all those Lepidoptera whose pairs of wings are never fastened together in flight; and call *moths* all those whose wings are so united.

"The popular division of Lepidoptera into 'butterflies' (*Rhopalocera*) and 'moths' (*Heterocera*) is quite unscientific, the butterflies being more nearly related to the higher moths than these to the lower moths. It has been proposed to separate the three lowest families which have . . . a jugum on each fore wing, as Jugatæ, from all other Lepidoptera—Frenatæ; also to divide the families with incomplete pupæ (*Incompletæ*) from those with obtect pupæ (*Obtectæ*); also to separate the lowest family on account of the structure of the first maxillæ as a suborder (*Laciniata*) distinct from all other families (*Haustellata*). On the whole, it is better not to adopt any division of the Lepidoptera between the order and the family." G. H. Carpenter, *Insects* (New York, 1899).

Butterflies, as a rule, go abroad in the daytime, seeking no concealment, and are brightly colored, while moths more usually fly in the twilight or at night, and are subdued in hue. Butterflies are distinguished by the terminal knob (or occasionally hook) of the antennæ, whence the common group-name Rhopalocera, while the antennæ of moths (*Heterocera*) are usually otherwise in form, often filiform or feathery. Butterflies have the habit of holding the wings in a vertical position over the back when at rest, while moths usually keep them flat.

Of the Lepidoptera represented in North America, the following families may be called *butterflies:* Hesperiidæ, Lycænidæ, Lemoniidæ, Nymphalidæ, and Papilionidæ; and all the rest *moths*, among which the Pterophoridæ, Tineidæ, Tortricidæ, Pyralidæ, Geometridæ, Noctuidæ, Bombycidæ, Zygænidæ, Pieridæ, and Sphingidæ are most important. Other families of both sorts belong only to South America or the Old World.

STRUCTURE. The head in this group is distinct from the thorax, clothed with hairs, and bears large, compound eyes, and moths have also simple eyes (*ocelli*). The antennæ are always present, and important not only as feelers, but as organs of hearing and smell (see INSECT), the latter service being probably a very important one in this group. These antennæ take various shapes. Among butterflies they are thickened at the end, sometimes into a rounded club, but more often into a spindle-shape terminating in a bent point. Of the moths "some have thread-like antennæ tapering to a fine point; others have feather-shaped antennæ; others still have antennæ which are prismatic in form, and provided with a little hook or spur, at the end; and there are many modifications and variations of these forms." The shape, or at least the size, usually varies between the sexes, being larger in the male than in the female—a fact connected with his duty to search for her, and especially observable in moths. The same may be said of the eyes, which, in the nocturnal species, cover the whole side of the head and have an enormous number of facets—27,000, it is said, in some hawk-moths.

The mouth in the Lepidoptera is modified into a sucking-organ, enabling this insect to feed on the nectar of flowers and the sap of trees and plants. The mandibles are rudimentary or absent, and the maxillæ, by a very extraordinary development and modification, are formed into a sucking-tube, called the proboscis, which, when not in use, is coiled up between two forward-projecting organs, the labial palpi. It is "composed of three distinct hollow tubes, soldered to each other along their inner margins," and "has much the appearance of a double-barreled gun, with a third tube lying below." Nutrition is imbibed through the lower or central tube, by a regular pumping, produced by the alternate muscular pinching and loosening of a bulb-like arrangement in the head; and the other tubes admit air. In some of the sphinx-moths the proboscis may be ten inches long, and in others its tip is armed with spines which serve to break or cut the surface of fruits, the juice of which is sucked up.

Wings.—The thorax bears the legs and wings. The former are weak and are merely used as organs of support when the insect is at rest, and the front pair of legs may be short or rudimentary, as is the case in Vanessa. The four membranous wings are usually large in comparison with the size of the body; expanse of wing and strength of flight, however, are not exactly correlated, for some of the hawk-moths with proportionately small wings are the most enduring flyers, yet the large-winged forms probably fly with less exertion. In actual size lepidopterans vary from almost microscopic species, hiding in the moss, to tropical monarchs 12 inches in expanse. These transparent membranes are supported by a framework radiating from the thoracic joints, which consist of double horny tubes (veins or 'nerves' and nervules) one within the other, the inner being filled with air and the outer with nutritive fluids. "These 'nerves,' as custom will persist in terming them, in the butterflies, take a bow-like or ellipsoidal sweep from the base of the wing, forming what is the 'discoidal cell,' whence there branch off to the edges a

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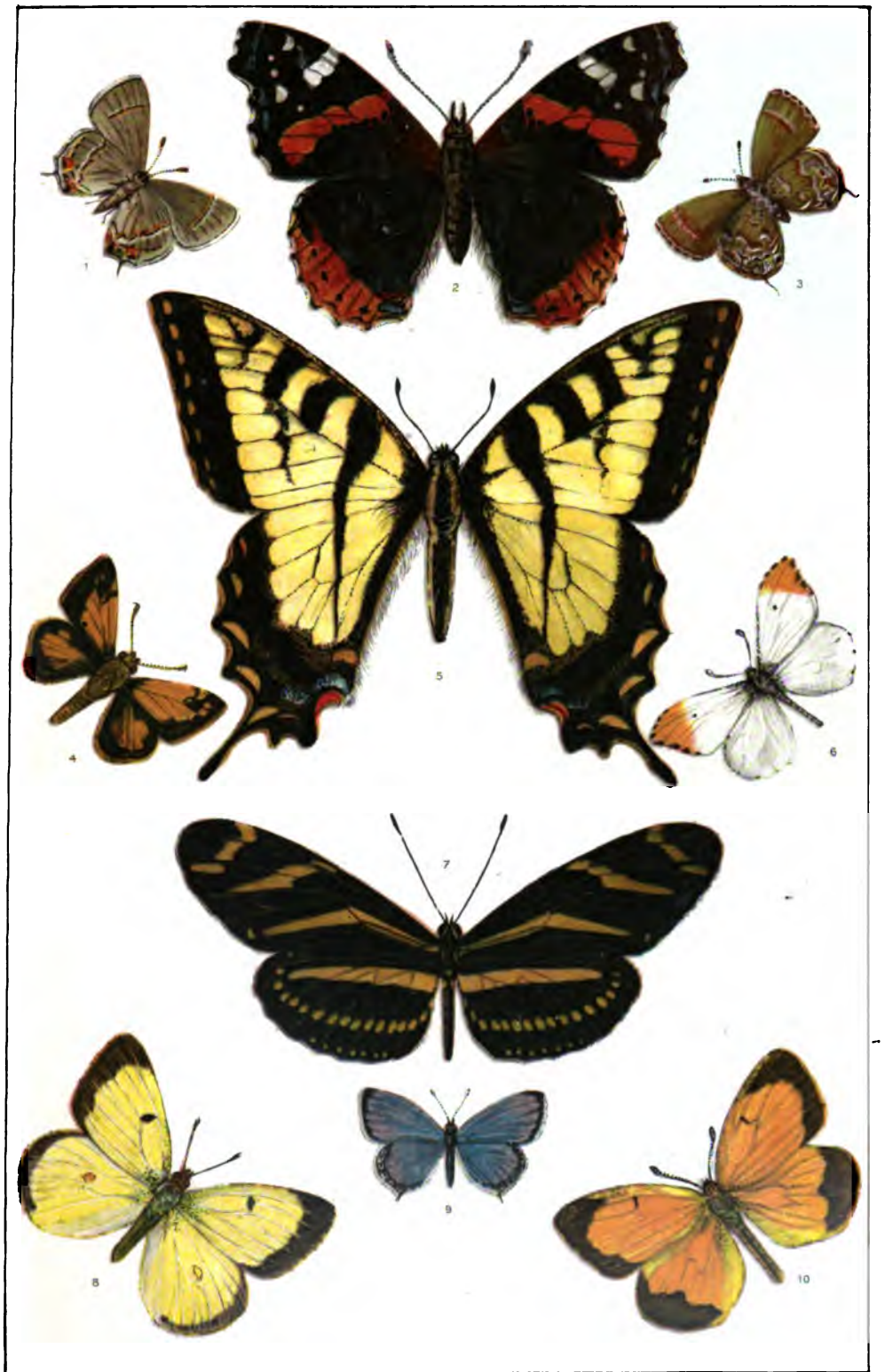
AMERICAN BUTTERFLIES



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1 GRAY HAIR STREAK - THECLA MELINUS (UNDER SURFACE)
2 RED ADMIRAL - PYRAMEIS ATALANTA
3 OLIVE HAIR-STREAK - THECLA DAMON (UNDER SURFACE)
4 HOBOMOK SKIPPER - ATRYTONE ZABULON
5 TIGER SWALLOW-TAIL - PAPILIO TURNUS
6 FALCOTE ORANGE-TIP - ANTHOCHARIS (EUCHLOE) GENUTIA
7 THE ZEBRA - HELICONIUS CHARITONIUS
8 YELLOW CLOVER BUTTERFLY - COLIAS PHILODICE
9 EASTERN TAILED BLUE - LYCAENA COMYNTAS
10 NICIPPE BUTTERFLY - TERIAS NICIPPE

ALL NATURAL SIZE

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series of horizontal, almost parallel, slightly divergent nervules. On the position of these the identification of species is most securely based. . . . In the moths, on the other hand, the discoidal cell is less conspicuous." The names of the parts of the wing, and of its veins and nervules, used by entomologists in their descriptions of species, are given in the accompanying illustrations. To further increase the power of the pinions, the pair on each side are made to act as one. This adjustment is effected either by an overlapping of the hind wing by the front wing (butterflies or some of the larger moths) or the posterior wing possesses a 'frenulum,' composed of one or more bristles, which fits into a 'retinaculum,' a membranous flap or a bunch of scales on the anterior wing (other moths). According to Hampson, "the form of the frenulum is of use in determining sex, as in the males of all the forms that possess it it consists of hairs firmly soldered together so as to form a single bristle, while in nearly all females it consists of three or more bristles, separate and shorter than that of the male."

Scales.—The wings of all Lepidoptera, as the word implies, are clothed more or less completely with scales, which are modified hairs—hairs that are very short and much widened; and every gradation may be found, in a species like Ithomyia, between the hairs on the body and wings and the scales. They are like small chitinous bags with the sides pressed together, and each one has on its proximal end a short stalk which fits into a cavity of the wing-membrane. They are of various shapes, notched on the posterior margin, striated, etc., and "the males of many species have peculiarly shaped scales arranged in tufts and folds, which are called 'androconia,' and are useful in microscopically determining species." The scales are in rows, and overlap much as do the scales on a fish or the shingles on the roof of a house. They rub off easily, and entomologists know how to remove them without serious injury; but when taken from a living insect they diminish or destroy its ability to fly. They number hundreds of thousands, and their use is to strengthen the membranous wings, and when they overlap the wing-membranes at the edges to a considerable extent, as occurs in some cases, they also increase the wing-area. Another use is to bear the colors of the wings, for when the scales are removed the color is gone. This color is due either to pigment contained within the scale or its walls, or to the fine striations on the upper surface which give rise to metallic 'interference colors.' Both albinism and melanism occur. The pigments are perhaps in the nature of biliary excretions, such as urates from nitrogenous matter and melanins from carbonaceous matter.

Distinctions of Sex.—The abdomen is composed of segments, nine for the female and ten for the male, and contains the viscera, and the lateral spiracles by which air is admitted to the respiratory system. It is shorter in most butterflies than the hinder wings; and in most moths is tufted along the dorsal line and on the end. The terminal segment has various appendages, and contains the sexual organs of both sexes. There is often a very striking difference in size, color, and form between the females, especially among the butterflies, where procreation may be the sole duty of the imago during its brief summer existence. In case there are several broods of butterflies in a season, each brood may have its characteristic coloration. Our Ajax butterfly is three-brooded, and before the facts of its life-history were known, each brood had been given a specific name. By artificially varying the temperature or moisture, any or all the seasonal forms may be produced at will from one and the same laying of eggs. The males, which are usually more gayly decorated than the females and exceed them in number, are continually in search, about the food-plants, of mates, who exert a far-reaching attracting power. Collectors utilize this instinct: having caught a female they expose it in a cage and soon are likely to find several males flocking about it. Under certain circumstances eggs may be laid by an unfertilized female, for which see REPRODUCTION—*Parthenogenesis.* Adherents of the doctrine of sexual selection believe the female exercises a choice among these assembled suitors, selecting for her partner the best, according to the standard of the species, and so maintaining the high quality of the race. A single impregnation is sufficient, and the impregnated females soon begin to lay eggs, having accomplished which, they die, in the great majority of cases, the exceptions being those which are double-brooded, or (a very few) where the adults largely survive the winter.

HIBERNATION AND MIGRATION. A few butterflies, such as the mourning-cloak, are able to endure in a state of torpidity the winters of the north. A large number winter over as pupæ, and others, like the brown and black Isabella caterpillar, as well-grown caterpillars. Others hatch out only in time to go into winter quarters. Many winter over as eggs, and not a few in two different stages, the latter having a double chance of surviving. It has been established by at least one set of careful observations that the cabbage butterfly (see CABBAGE INSECTS) of southern Europe migrates or flies in a general southerly direction in the fall and northerly in the spring. In the United States the milkweed butterfly (q.v.) sometimes so migrates in enormous swarms. Such migrations are even more common in the tropics. In his work on Ceylon, Sir James Tennent writes of "the extraordinary sight of flights of these delicate creatures, generally of white or pale yellow hue, apparently miles in breadth, and of such prodigious extension as to occupy hours and even days uninterruptedly in their passage." These migrations are at times occasioned by lack of food-plants on which to deposit eggs. In other cases we know they are seasonal. By going south the butterflies find a climate in which they are able to winter.

REPRODUCTION AND METAMORPHOSIS. The eggs of all Lepidoptera are laid on or near the food-plant, that is, the plant upon which the young must feed. In number they vary from less than one hundred to several thousand, and are deposited continuously and rapidly, as a rule. They may be placed singly, as is common among butterflies, or, as is more usual among moths, in clusters or masses, adhering to their support and perhaps to each other by a glutinous coating; while some moths prepare a sort of nest of hairs plucked from their bodies upon and within which the eggs rest, or otherwise protect them from observation or the weather, especially those destined to last through a northern winter

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or tropical season of drouth. Their membranous shells take various forms, and are often exceedingly beautiful when seen through the microscope. "Some," says Holland, "are spherical, others hemispherical, conical, and cylindrical. Some are barrel-shaped, others have the shape of a cheese, and still others have the form of a turban. Many of them are angled, some depressed at the ends. Their surface is variously ornamented. Sometimes they are ribbed . . . [and] between these ribs there is frequently found a fine network of raised lines variously arranged. . . . As there is great variety in the form of the eggs, so also is there great variety in their color. Brown, blue, green, red, and yellow eggs occur. Greenish or greenish white are common tints. The eggs are often ornamented with dots and lines of darker color. . . . Fertile eggs, a few days after they have been deposited, frequently undergo a change of color, and it is often possible with a magnifying-glass to see through the thin shell the form of the embryo which is being developed within the egg." The eggs may hatch in a few days or only after months, for numerous species pass the winter or the dry season in the egg. The larva born in the egg, and which escapes by an opening, of curious structure, at the upper end of the shell, called the micropyle, is known as a caterpillar.

This larva, or 'caterpillar,' is a worm-like creature, and takes a form, color, etc., characteristic of its group and species. The term properly is restricted to lepidopterous larvæ alone, though sometimes applied to other larvæ, as those of the saw-flies. The head of the caterpillar is conspicuous, often large, and composed of horny (chitinous) material, taking various shapes. It is provided with six simple eyes (*ocelli*), usually to be seen only with the aid of a lens, which are either just above each mandible, or on each side of the head; there are two rudimentary antennæ. The mouth is adapted for tearing, cutting, and masticating the substances on which the caterpillar is destined to feed, which are very various in the different species, although in all extremely different from the food of the perfect insect; it is provided with strong upper and lower jaws; a labium, or lower lip; and four palpi. In the mouth (labium) also is situated the spinneret of those species which, when they change into the chrysalis, envelop themselves in silken cocoons. (See SILK.) The first three segments of the body are each furnished with a pair of short legs, which are hard, scaly, and clawed, and represent the six legs of the perfect insect; some of the remaining segments are also furnished with short feet (prolegs), varying in all from four to 10 in number, the last pair situated at the posterior extremity of the body; but these are membranous or fleshy, and armed at their extremity with minute hooks. Those caterpillars in which the prolegs (which are shed in the last molt) are pretty equally distributed along the body, move by a sort of regular crawling motion; but those which have only four such feet, near the posterior extremity, move by stretching the body out to its full length, taking hold by their fore feet, and then bending the body into an arch, thus bringing the hind feet forward, when the body is stretched out again for a new step, and so on; this last is the method of progression of the geometrid moths, called loopers, inch-worms, or measurers. The larva appears to guide itself by its feelers (palpi). The heads of many caterpillars also have defensive spines, or arrangements for emitting noisome liquids or odors, to be referred to later.

The body of the caterpillar contains nearly all the organs of the adult butterfly or moth. Respiration goes on through nine spiracles on each side, two on each ring, except the second, third, and last. There are no external traces of sexual organs, but there arise, during this stage, the 'imaginal disks,' which develop into the wings and legs of the adult insect. These rudiments of wings exist even in very young caterpillars as a thickening and bagging in of the hypodermis. Into this bag, trachea and blood make their way. Just how these internal wings reach the outside is not known; probably by the destruction of the outside hypodermis. If the wing-membrane breaks during development, so that the blood or hæmolymph exudes, the injured wing will be smaller or deformed. Sometimes the wings fail to expand properly because they dry too soon, and a wet sponge under a bell-jar, with transforming Lepidoptera, will aid in the production of perfect specimens.

Feeding Habits and Mischief.—Caterpillars find themselves at birth in contact with proper food, and begin at once to devour it, and to obey certain other instincts necessary to their life and prosperity. This is the stage in which the butterfly or moth gets most of its nourishment and growth, none taking food in the next or pupal stage, and many not feeding at all, as imagos. The great majority are vegetable-eaters, many being limited to a particular kind of plant, or to a few nearly allied plants. Some feed on flowers, some on seeds, some on roots, and some even on the woody portions of stems; some on wool, hides, furs, and other animal substances; a few on lard and other kinds of fat. Some feed in the dark, and some in the light. Some kinds seem to eat almost incessantly, but most of them have alternate periods of ravenousness and quiescence. As many of the favorite food-plants have been cultivated by civilized man, and other substances eaten by these creatures have been made use of by him, he has multiplied by his operations the supply and consequently the numbers of certain species until they have become pests, destructive of his work and profits. It is in the caterpillar stage that almost all the destructiveness of the Lepidoptera is accomplished. On certain years they succeed in denuding whole forests or many fields. The cutworm, the army-worm, and the cotton-worm are well-known pests. Their voracity is remarkable. According to Trouvelot, when a Polyphemus caterpillar hatches, it weighs one-twentieth of a grain, and when it is 50 days old, it weighs 207 grains, and has consumed 120 oak-leaves, weighing three-fourths of a pound. "So the food taken by a single silkworm in 56 days equals in weight 86,000 times the primitive weight of the worm. What a destruction of leaves this single species of insects could make if only a one-hundredth part of the eggs laid came to maturity! A few years would be sufficient for the propagation of a number large enough to devour all the leaves of our forests."

Taken as a whole, caterpillars are economically so injurious that were it not for the great depletion of their numbers by their multitudinous

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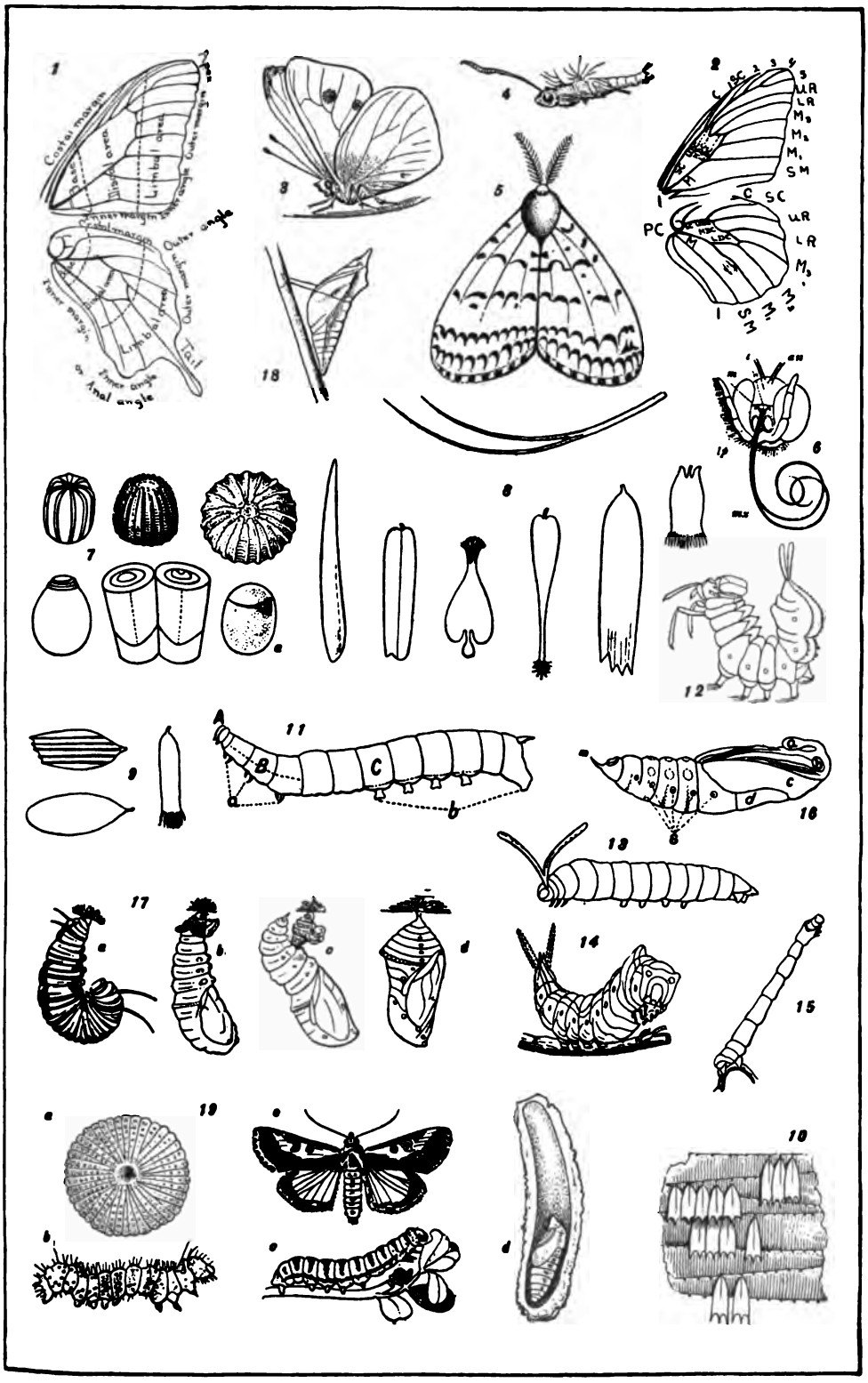

For names and descriptions, see article "Butterflies and Moths."

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foes, they would soon destroy the vegetable kingdom. They injure, or even kill, shrubs and trees, as well as all sorts of garden vegetables. They eat woolen stuffs of all kinds and furs. To offset all their destructiveness, they offer little save silk that is, at present at least, known to be useful to man. There are a few species that are helpful to vegetation, such as the Lycænidæ, which feed on plant-lice and scale-insects. One such species (*Feniseca Tarquinius*) occurs in the United States. A few forms are aquatic and feed on plants under water.

Self-Protection in Caterpillars.—The skin of some caterpillars is naked, that of others is covered with hairs, spines, or tubercles. Most are solitary, but some make for themselves nests or tents of silk, under which they dwell in societies, protected from the inclemency of the weather. Many construct cases or sheaths by agglutinating various substances together, as the caterpillar of the common clothes-moth. Some roll together leaves, and fix them by threads, so forming a dwelling for themselves; and a few burrow and excavate galleries in the substance of leaves or in the pith of plants. Most of them are in color brown or green, while those hidden in galleries are whitish; but many carry gaudy colors and numerous ornamental or strange protuberances. All these characteristics are connected with Nature's effort to protect them from their enemies. Alfred Russell Wallace has made clear the fatality to caterpillars of even slight wounds, for "a slight wound entails great loss of blood, while a modest injury must prove fatal." Therefore devices that enable caterpillars to escape the notice or the attacks of enemies are very useful to them. Many caterpillars possess a disagreeable smell, or a nauseous taste, or both. Thus, those of the swallow-tailed butterflies "are provided with a bifurcate or forked organ, generally yellow in color, which is protruded from an opening in the skin back of the head, and which emits a powerful odor; this protrusive organ evidently exists only for the purposes of defense." Most caterpillars resist an attack by hurling their bodies violently from side to side. Others assume startling attitudes, or have a surprising arrangement of color. These terrifying attitudes may accompany disagreeable tastes and so serve more vividly to impress upon the foe the unpleasant quality of the prey. Nevertheless, as Professor Poulton has stated, hungry animals may come to eat and like distasteful caterpillars. Certain caterpillars escape the enemy by resembling the color of the background, concerning which more is to be said elsewhere. Others, such as the geometrids or measuring worms, may combine with this protective coloration the capacity of attaching themselves by the hind end and stretching out in the air like a twig. This rigid attitude they may maintain for some time. Imitation may even be carried to the length of mimicking other kinds of animals. Thus the huge eye-spots, peculiar folds, and marks on the anterior end give some forms the appearance of snakes or other strong animals. The color of caterpillars is due to two sources: (1) Pigment gained from the food; (2) Pigment inherent in the deep-lying tissues or skin. Most green caterpillars seem in some way to be colored by the chlorophyll of the food-plant. Yellow is derived mainly from xanthophyll of plants. Pigment derived from food-plants tends gradually to give the caterpillar the coloration of the surroundings. See PROTECTIVE COLORATION; MIMICRY; etc.

Struggle for Existence.—Only a few out of the vast hosts of caterpillars ever reach maturity. Many are destroyed by cold, wet, drouth, or lack of food. Vast numbers fall prey to birds, reptiles, and mammals. Many others are caught by wasps and stored up as food for the young, or are captured by adult and larval predaceous beetles. Ichneumon flies deposit their eggs within great numbers of caterpillars, where they develop and eventually kill the caterpillar or pupa. Tachina-flies also lay their eggs on caterpillars and the larvæ are parasitic within them. In addition, caterpillars are subject to fungus and various other contagious diseases which are particularly fatal to the cultivated silkworm.

Molting.—Soon after the caterpillar begins to take food and increase in size, it is obliged to shed its skin, which has become too tight. To take its place, a larger, soft one is developed beneath the old one. This new skin becomes, in its turn, too tight and unelastic, and must be shed. A number of such moltings or ecdyses take place before the embryo attains full size. These normally occur at regular intervals, and four or five molts complete the growth; but "in cases where caterpillars hibernate . . . a long interval necessarily elapses. Some Arctic species are known in which the development from the egg to the perfect insect covers a period of two or three years." The manner in which the molting is effected is very interesting. When the necessity is felt, the caterpillar ceases feeding, attaches itself firmly to some object, and becomes quiet for a time. "The process begins with a splitting of the skin on the upper surface of the thorax; this is continued forward to the head, which opens along the sutures. The head and thorax of the new stage, or 'instar', are then worked out by an energetic wriggling motion of the insect, and the old skin is gradually stripped off from before backward, like the finger of a glove. In caterpillars it is known that a fluid, secreted by glands in the hypodermis, is present at molting-times between the new and the old skin, which it helps to separate."—*Carpenter.*

The caterpillar may be regarded as a recapitulation of one stage in the phylogenetic development, that is to say, in the evolution of the lepidopterous insect. It may indeed be said to reproduce a stage in the phylogeny of insects best represented to-day by Peripatus, a primitive and widely distributed genus that serves to connect arthropods with worms.

Pupation.—After a caterpillar has passed through the period of successive feedings and moltings which the economy of its species requires, it prepares to pass into the second larval stage and become a *pupa*, in which tough integuments cover the developing organs instead of soft skin. Pupæ may cover themselves with a case of silk or other materials, called a cocoon, or may remain naked, in which case they are known as chrysalids (sing. *chrysalis*). The former is the custom among the moths—the latter among the butterflies. The insect in this stage is utterly helpless, and a cocoon serves as a protection. It is spun as the last act just before passing into the pupal stage, and is formed of silken threads, produced by the hardening of the fluid secreted by the spinning glands. These may be

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wound round and round the larva until the silken case thus made suffices; or they may form merely the lining of an earthen cell (for many species pupate under ground), or they may serve to bind into the cocoon their own hairs, chips of wood, or other materials, or to tie down rolled leaves, or form a web-like network hung like a bag or a hammock from some support, or making a fuzzy mass in some crevice or among leaves and twigs. When the work of spinning the silk is once begun, it is carried on almost without cessation for several days. The forms of cocoons are various; when not concealed, they are usually of a tint that blends well with their surroundings, leaving them inconspicuous, while their material is calculated to resist the attacks of insect-eating birds and mammals, or of ichneumon-flies and other intending parasites.

Cocoons are mainly the work of moths, to which the term 'pupa' is now frequently restricted, for the butterflies pass their pupal stage incased in comparatively rigid integuments, which form a 'chrysalis.' They vary greatly in form, some being acorn-like, others very angular, etc., and most are obscure in tint, so as to be easily overlooked, but some are brilliant in color, usually of golden or metallic hues, whence the name *chrysalis*. Some butterfly chrysalids (Nymphalidæ) are simply suspended from the posterior end (*Suspensi*); those of others (Papilionidæ) are held in place by an additional strand or girdle of silk (*Succincti*). Within the chrysalis or cocoon is the immature butterfly or moth, and all the parts belonging to the future adult insect may be found by examination. Breathing goes on through air openings, and the parts steadily develop. "The pupæ of the vast majority of moths, of butterflies, and of two-winged flies have the limbs and wings not merely pressed close to the body, but immovably fixed thereto by a general hardening and fusion of the outer skin. Such pupæ are distinguished as 'obtect.' But although the limbs are incapable of motion, certain abdominal segments remain free, so that the hind body can be, to some extent, bent and turned about; and, by means of rows of spines on the abdominal segments, the pupa is, in many cases, enabled to work its way out of its shelter, when the time for the final change has arrived." Such are styled 'incomplete.' The pupal stage may be of long or short duration. Many Lepidoptera pass the winter or the tropical dry season as pupæ. Some have several broods a year, and in such the pupal stage of the hibernating brood will last longer than that of the others.

The Imago.—When the pupa has arrived at maturity, its coverings split and allow the emergence of the 'imago' or perfect insect. "Hardly anything in the range of insect life," remarks Dr. W. J. Holland, "is more interesting than the rapid development of the butterfly after its first emergence from the chrysalis. . . The imago, as it first emerges, is provided with small, flaccid wings, which, together with all the organs of sense, such as the antennæ, require for their complete development the injection into them of the vital fluids, which, upon first emergence, are largely contained in the cavities of the thorax and abdomen. Hanging pendant on a projecting twig, or clinging to the side of a rock, the insect remains, fanning its wings, while by the strong process of circulation, a rapid injection of the blood into the wings and other organs takes place, accompanied by their expansion to normal proportions, in which they gradually attain to more or less rigidity. . . The body is robbed of its liquid contents in a large degree; the abdomen is shortened up; the chitinous rings which compose its external skeleton become set and hardened; the wings are expanded, and then the moment arrives when, on airy pinions, the creature that has lived a worm-like life for weeks and months, or which has been apparently sleeping the sleep of death in its cerements, soars aloft in the air, the companion of the sunlight and the breezes."

It is impossible here to go into any description of butterflies and moths. Butterflies, as a rule, are more brilliant than moths, many of them, in the tropics, especially resplendent in metallic hues, rivaling those of the 'eyes' of peacock-plumes. Moths, on the contrary, are more usually dull of hue, and less given to appearing in open places, even when they fly by day, yet some are high-colored and beautiful.

Both butterflies and moths, and their caterpillars, may resemble to some extent the shape of the object or the coloration of their background, or of other insects. Thus they illustrate most strikingly and copiously various phases of 'mimicry' and 'protective coloring.'

Butterflies, like bees and many other insects, carry pollen from flower to flower, and hence aid greatly in the formation of seeds. See CROSS-FERTILIZATION; INSECTS AND FLOWERS.

GEOGRAPHICAL DISTRIBUTION. Lepidoptera occur wherever plant-life suited to the nourishment of the caterpillars is present. They are sun-loving forms, and are most numerous in species in the tropics. However, in numbers of individuals, some of the temperate zone forms far outrank any of the others. Some species occur in the Arctic zone and on the tops of snow-clad mountains. Certain forms flourish in the far north, in Greenland, Labrador, and Iceland, or on tops of snow-capped mountains. Some species are restricted by temperature or food-plant to a very limited area, while others are practically of world-wide distribution. Widely distributed forms either feed on widely distributed plants, or can feed on a number of different food-plants.

The delicacy of the Lepidoptera has prevented their common preservation as fossils. The Tertiary rocks of the western United States, and the rocks from the time of the British chalk down, have yielded remains of a few scattered species.

About 50,000 species of Lepidoptera are known, of which 6,000 occur in America north of Mexico. Of skippers there are two families—the large skippers, Megathymidæ, and the smaller skippers, Hesperiidæ. The butterflies include the Papilionidæ, Pieridæ, Lycænidæ, and Nymphalidæ, and all other families (over 40) belong to the moths.

BIBLIOGRAPHY. For general works, see bibliography under INSECTS; A. Hyatt and J. M. Arms, "Meaning of Metamorphosis," *Natural Science*, *VIII.* (London, 1896); E. B. Poulton, "Neurology of Pupæ," in *Transactions of the Linnæan Society* (London, 1890); T. A. Chapman, "Pupæ of Moths," in *Transactions of the Entomological Society* (London, 1893); and subsequently W. F. Kirby, *Handbook to European Butterflies and Moths* (with guide to literature of the order. 5 vols., London, 1895); S. H. Scudder, *Butterflies of New England* (3 vols., Cambridge, 1889); W. J. Holland, *The Butterfly Book* (New York, 1898);

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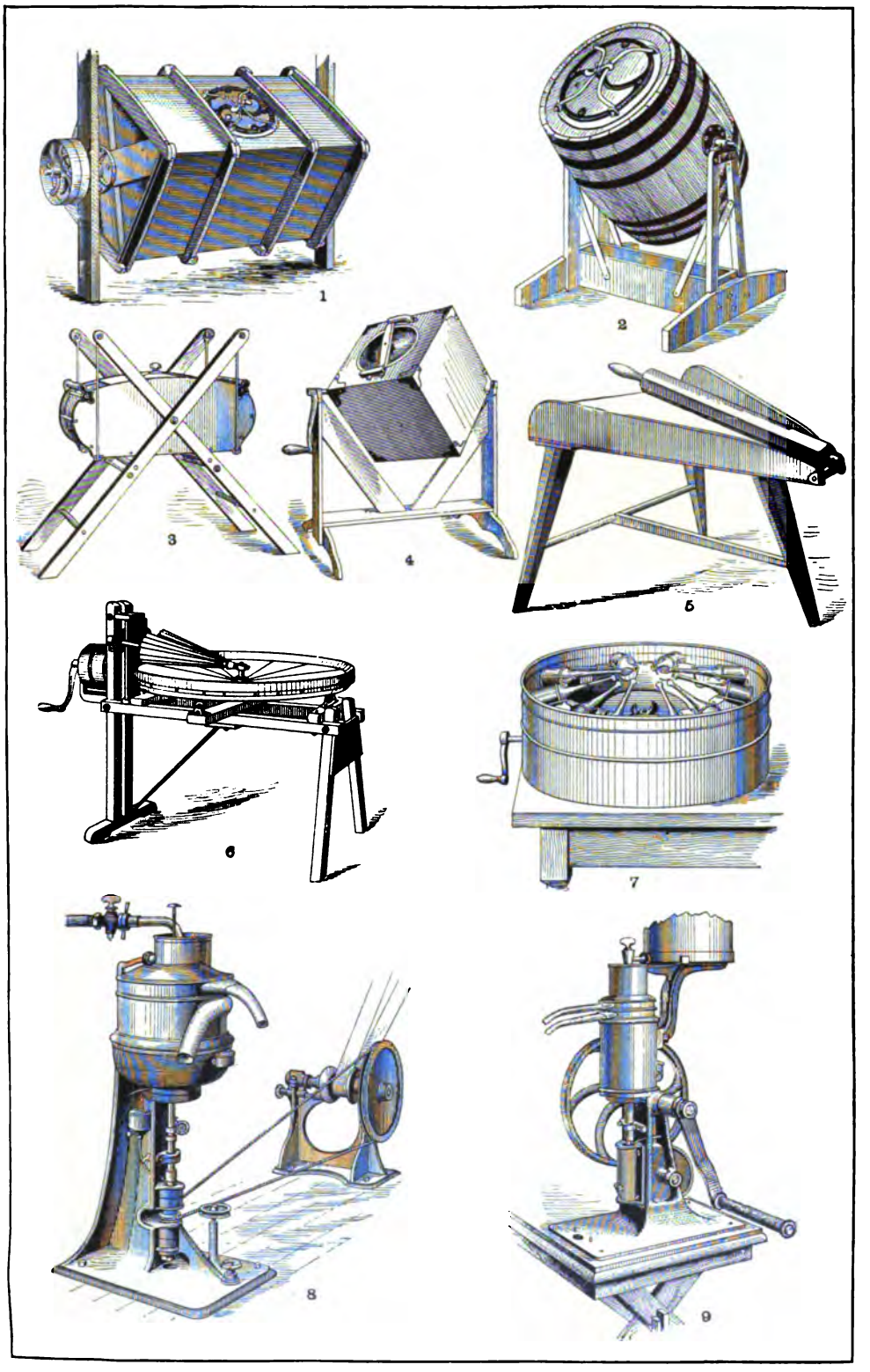
BUTTER-MAKING MACHINERY



1-4. TYPES OF CHURNS FOR HAND AND POWER.
5-6. BUTTER WORKERS.
7. BABCOCK MILK TESTER.
8. POWER SEPARATOR.
9. HAND SEPARATOR.

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G. H. French, *Butterflies of the Eastern United States* (Philadelphia, 1895); A. Weismann, *New Experiments on the Seasonal Dimorphism of Lepidoptera*, translated by W. E. Nicholson in *Entomologist*, January-August (London, 1896); Walker, *British Museum Catalogue of Lepidoptera* (London, 1854-56); Herrich-Schaffer, *Systematische Bearbeitung der Schmetterlinge von Europa* (Regensburg, 1843-56); Doubleday and Westwood, *Genera of Diurnal Lepidoptera* (London, 1846-62); H. J. Elwes, "The Distribution of Butterflies," in *Proceedings of the Entomological Society* (London, 1894); A. S. Packard, *Text-Book of Entomology* (New York, 1898). For works relating to special families and species, see their names.

PLATE OF BUTTERFLIES AND MOTHS.

1. Butterfly's wings, giving names of parts.
2. Wings, giving names of veins and nervules; I, I, internal veins; C, costal veins, SC, subcostal vein; SC, 1, 2, 3, 4, 5, subcostal nervules; UR, upper radial; LR, lower radial; M, median vein; M, 1, 2, 3, median nervules; SM, submedian veins; PC, precostal nervule; UDC, MDC, LDC, upper, middle and lower discocellulars [after Holland].
3. Resting position of a butterfly.
4. Typical antenna of a butterfly.
5. Resting position of a moth (with typical plumose antennæ).
6. Mouth-parts of a butterfly, showing the extended double proboscis (maxilla, *mx*), mandibles (*m*), labrum (*l*), labial palpi (*lp*), and base of the antennæ (*an*) between the great eyes.
7. Some of the many forms of lepidopteran eggs; *a*, one with a lid lifted at hatching for egress of larva.
8, 9. Forms of wing-scales.
10. Arrangement of the scales clothing the wing.
11. A caterpillar, showing parts: A, cephalic segments (head); B, thoracic segments; C, abdominal segments: *a*, rudiments of the six true legs; *b*, four pairs of prolegs.
12. Caterpillar of a moth (*Stauropus fagi*), showing use of prolegs in walking, and extreme development of thoracic larval legs.
13. Caterpillar of a Papilio, showing its retractile osmateria protruded from the neck.
14. Caterpillar of a puss-moth, showing retractile anal mastigia extended.
15. Caterpillar or measuring-worm of a geometrid moth in an erect and stiffened position simulating a dead twig.
16. Parts of a pupa (chrysalis of a Sphinx-moth): *a*, tongue-case; *b*, eye-case; *c*, trunk-case; *d*, first abdominal segment; *m*, point terminating abdomen; *s*, spiracles, or breathing-pores, opening into trachea.
17. Process of change of a butterfly (*Anosia plexippus*) caterpillar into a pupa (after Riley): *a*, caterpillar just before the rending of the skin; *b*, chrysalis just freed from the molted caterpillar skin, except the cremaster; *c*, pupa holding itself in place, head down, by seizing the folds of the shed skin between the edges of its abdominal segments while it searches with its cremaster for the button of silk, attached to a twig or leaf, in which it will hook the cremaster and hang; *d*, fully developed form of the chrysalis (light green with gold "buttons"). This is an example of a suspended pupa (Suspensi).
18. A belted pupa (Cincti).
19. History of transformation in the Lepidoptera (a moth): *a*, egg; *b*, young larva; *c*, mature larva (caterpillar); *d*, pupa, within a cocoon; *e*, mature moth (imago).

BUTTERFLY-FISH. A fish of a tropical marine family (Chætodontidæ), so called because of its gay colors and fluttering activity about the coral reefs, among whose growths it chiefly makes its home, and where it lives by capturing small animals, darting about with an irregular agility suggestive of a butterfly in a garden. It is small, short, very much compressed and deep, and the scales extend over the dorsal and ventral fins so that it is difficult to say where the fins merge into the body. The flesh is excellent food. See CORALFISH.

BUTTERFLY-WEED (possibly on account of its gaudy orange-red flowers), or PLEURISY-ROOT, *Asclepias tuberosa*. A plant found in many parts of the United States, and which has obtained a considerable reputation for the medical virtues of its root. The root is large, formed of irregular tubers, or spindle-shaped branches, externally yellowish-brown, internally white, with a somewhat acrid, nauseous taste when fresh, merely bitter when dried. It yields its properties to boiling water, and is usually administered in the form of a decoction, fluid extract, or sometimes as a powder. It is diaphoretic and expectorant, and has been found useful in the early stages of pulmonary affections, in rheumatism, and in dysentery. The stem of the plant is erect, 1 to 2 feet high, and hairy; the flowers a brilliant orange-yellow. The sap of the plant is not milky. See ASCLEPIAS.

BUTTERINE. A name for a butter substitute, used interchangeably with oleomargarine. See OLEOMARGARINE.

BUTTER-MAKING. The process of making butter from cow's milk is divided into the operations of creaming, churning, and working or finishing. The fat in milk exists in the form of minute globules in suspension. In the operation of creaming, the separation of these globules from the rest of the milk is effected either by setting the milk in shallow pans or in deep cans in cold water, or by means of a cream-separator. It is possible to make butter by churning the whole milk without first creaming it, and this was undoubtedly the practice in earlier days, but there is far greater loss of fat in this way, and the churning of large quantities of milk is very laborious. In both shallow and deep setting the cream is raised by gravity. The fat-globules, being lighter than the water and other constituents of the milk, gradually rise to the surface on standing, carrying with them some of the other constituents also. The time required and the completeness of the operation depend upon the size of the fat-gobules, which differs in the case of different breeds of cows, the larger globules rising more readily. The fat left in the skim milk consists mostly of small globules which failed to rise as soon as the others. The fat content of the skim milk is the measure of the efficiency of creaming. In shallow setting in pans the force of gravity alone is relied upon, the milk being set as quickly as possible after it is drawn, and the cream skimmed off after standing twenty-four hours or longer. The loss of fat by this method is quite large, amounting to about 20 per cent., and the skim milk contains from 0.5 to 1.5 per cent. of fat. In deep setting, cans about 18 inches deep are used, and these are immersed or partially submerged in cold water, preferably at about 40° F. The low temperature causes the globules to rise more rapidly and more completely than in shallow setting. The milk is allowed to stand in these cans for eighteen to twenty-four hours, and the cream is then removed from the top by means of a dipper, or the skim milk is drawn off from below, leaving the layer of cream in the can. The latter method is the least wasteful, and by it the fat in the skim milk may be reduced to as low as 0.2 per cent. under favorable conditions. Efficiency in deep setting depends upon cooling the milk rapidly as soon as it is drawn, and in maintaining a temperature a little above freezing. If the temperature is allowed to rise there is a material loss of fat in the skim milk. The separator has quite generally superseded deep or

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shallow setting in creameries and in large dairies during the past few years. In this method the cream is separated from the milk by centrifugal force, in a bowl or drum, revolving at a high rate of speed, from 5000 to 8000 revolutions a minute and even more. The milk enters through a tube reaching to the centre and near the bottom of the bowl, where the high rate of speed causes the heavier milk fluid (the serum) to gravitate toward the circumference of the bowl, while the lighter cream remains near the centre and rises to the upper part of the bowl. The skim milk flows out through a side tube, and the cream through a second tube leading from the centre near the top. The operation is continuous, milk flowing into the bowl and skim milk and cream flowing out of it without interruption. The rate of separation varies with the size and capacity of the machine, the smaller hand separators skimming from 200 to 500 pounds an hour, and the larger forms 2000 pounds and over. By means of various appliances within the bowl the separation of the fat is made quite complete, the skim milk from a good separator properly operated containing only about 0.1 per cent. of fat and in some cases only 0.05 per cent.

The cream obtained by setting or by the separator may be churned at once, as is the case in making sweet-cream butter, or may be first 'ripened' or soured. The object in ripening is to develop the characteristic flavors of butter and a slight acidity which aids in churning and affects the texture of the butter. Ripening is effected by adding to the cream a 'starter' of sour skim milk, buttermilk, or cream from a preceding churning, or a commercial preparation of the desired micro-organisms called a lactic ferment or pure culture. It is necessary to prevent access to the cream of any germs which may cause improper souring, or impart an undesirable taste or quality to the butter, and it is with this view that pure cultures are used for ripening. Pasteurization of the milk or cream used in butter-making, which is practiced quite extensively in some countries, has the same object, the theory being to kill all the germs which may be in the milk or cream, and add only such as are desirable.

The cream is ripened with the aid of the starter mentioned, by keeping it at a constant temperature (60° to 70° F.) until the proper amount of acid has developed, the time required depending upon the number of germs present and upon the temperature. It is then ready for churning. In this process the cream is agitated in a churn (q.v.) to cause the particles of butter fat to unite into masses so that they can be separated from the buttermilk. This is accomplished at a temperature of from 50° to 65° F., the larger fat-globules congealing and uniting first, and the smaller ones adhering to these as they come in contact with them. Finally the whole body of fat may be brought together in a practically solid mass and the buttermilk drained off. After washing, the butter is worked by hand or by machine (see BUTTER-WORKER) to remove the buttermilk and washings more completely, is salted to suit the taste, and then is either packed in tubs or boxes, or made into prints.

Various factors affect the quality of butter aside from the care in making. Among these are the feed of the cows, the conditions under which they are kept, the stage of lactation of the cows, the handling of the milk and cream to avoid absorbing odors or becoming tainted, etc. The perfection of the separator and other dairy machinery has led to material improvement in the quality of American butter, and has made possible to make good butter in almost all parts of the United States. Scrupulous cleanliness and close attention to every detail, from the production of the milk to the final packing of the finished product, are prime requisites to success. Since the introduction of the creamery system the amount of butter made on farms has greatly decreased, but there is still much more butter made on farms than in creameries, although creamery butter controls all the large markets. See, also, CREAMERIES and DAIRYING. For more detailed accounts of the processes of butter-making, the reader is referred to H. E. Wing, *Milk and Its Products* (New York, 189[illegible]); "Butter-Making on the Farm," *United States Department of Agriculture, Farmers' Bulletin*, No. 57 (Washington, 1899); and *Handbook of Experiment Station Work*, also issued by the United States Department of Agriculture.

BUTTERMILK. The liquid remaining after the butter fat has been separated from cream by churning. It consists largely of the water, sugar, casein, and ash of the cream, together with a small amount of lactic acid produced in the ripening of the cream (see BUTTER-MAKING), which gives it a slightly acid taste. It also contains a small amount of fat, depending upon the completeness of churning, which failed to separate from the serum. Its composition varies, but is approximately as follows: Water, 91; casein, 3; milk sugar, 4.8; fat, 0.5; and ash, 0.7 per cent. It is a healthful and nutritious beverage, much relished by some persons. In many localities it is used to a considerable extent for feeding pigs, corn-meal or some other grain being usually added to it. For this purpose it has been found to be nearly equal to skim milk, which contains about one-fifth more solid constituents. The pork produced upon it is of excellent quality. See BUTTER-MAKING.

BUTTERNUT (so called on account of its oil), or WHITE WALNUT (*Juglans cinerea*). A large, wide-spreading American tree 50 to 75 feet high, ranging from New England to Georgia, and west to Minnesota and Kansas, with nearly smooth bark, and large compound leaves. The leaves and green nuts are clammy and pubescent. The nuts are well known, and form agreeable food when dried; when taken green and pickled they are prized for the table. The nuts contain as much as 4 per cent. of fixed oil, which is sometimes extracted or expressed. Sugar can be made from the sap, but it is much inferior to that made from the maple. The timber is useful for coach and cabinet work, posts, rails, and wooden bowls. The bark of the root is mildly cathartic. A dyestuff was formerly prepared from the bark and husks, and was quite widely used at one time for dyeing woolens, etc., a light reddish brown. For additional illustration, see Plate of BRAZILNUT. See WALNUT.

BUTTER, ROCK. See ROCK BUTTER.

BUTTER-TREE. A name given to several tropical trees, of different orders, the fruit of which yield complex fixed oils, having somewhat the appearance, and used for the purpose, of butter. The butter-trees of India and Africa

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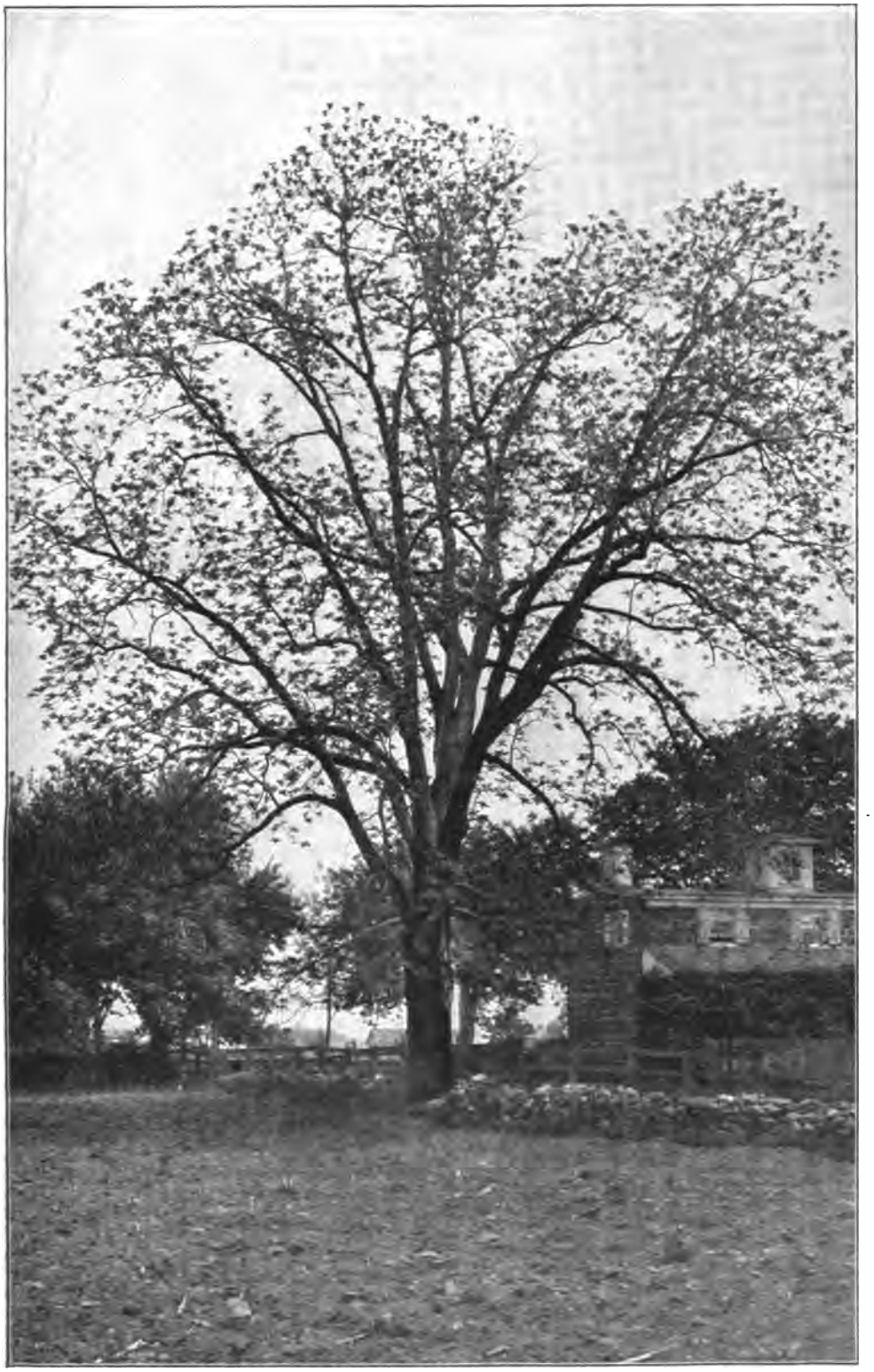
BUTTERNUT TREE



BUTTERNUT (Juglans cinerea), Northern New Jersey, early May.

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belong to the genus Bassia, of the order Sapotaceæ; the butter-trees of Guiana and Brazil to the genus Caryocar (q.v.), of the order Caryocaraceæ. The oil-palm (q.v.) and the Cocos butyracea (see COCOANUT) may also be regarded as butter-trees, although not generally receiving that name.

The mahwa, madhuca, or mahowa of the East Indies (*Bassia latifolia*) attains a height of 50 feet and is found in stony and mountainous parts of India. The succulent corollas of the flowers are eaten raw, and a kind of spirits is distilled from them. They also yield an essential oil. The seeds yield by expression a thick, greenish-yellow oil used as food and also for lamps. The Indian butter-tree, *Bassia butyracea*, occurs in the more mountainous parts of India. The tree grows to a height of 50 to 60 feet. The wood is light and of no great importance. The fruit is eaten to some extent, and from the seeds is expressed the oil or butter, which is white, and is extensively used. The Indian oil-tree, *Bassia longifolia*, is a related species, the seeds of which are used in a similar manner to the others. The wood is said to resemble teak in its strength, hardness, and durability. *Bassia pallida* is said to yield gutta-percha. The butter-tree of Central Africa, described by Mungo Park, is now known as *Butyrospermum Parkii*, although formerly considered a species of *Bassia*. It produces the *Galam butter*, also called *Shea butter* (i.e. tree-butter), which is highly valued and forms an important article of internal commerce in the interior of Africa. The seeds of the fruit, which resembles an olive, are dried in the sun, or in a peculiar kind of oven, and the kernels are then boiled in water, in order to obtain the butter from them, which not only keeps for a whole year without salt, but is also whiter, more solid, and more pleasant to the taste than the butter of cow's milk. This butter is used both as an article of food and of medicine. It has been supposed that the introduction of this tree might be of great importance in other tropical countries.

BUTTER-WORKER. A machine for working butter to remove the buttermilk and washings, to incorporate the salt, and to bring the butter into compact form. (See BUTTER-MAKING.) Both hand and power workers are used; and there are also several forms of the combined churn and butter-worker, in which the butter is worked within the churn without removing it. The latter are always operated by power. Butter-workers reduce the labor of butter-making, and aid in producing a better butter. They make it unnecessary for the hands of the maker to come in contact with the product, and as the grain of the butter is least affected by working it at a temperature of from 45° to 55°, this is an important advantage. They are now very generally employed in creameries and large dairies. See BUTTER-MAKING.

BUTTERWORT (a *wort*, or root, secreting a greasy, butter-like substance) (*Pinguicula*). A genus of plants of the order Lentibulariaceæ. The species are small plants with rosettes of radical leaves that secrete viscid fluid, which catches insects. They are found in bogs and marshes of different parts of the world. The flowers have spurred bilobed corollas, and often have some beauty, especially those of *Pinguicula grandiflora*, a rare native of the south of France and of Ireland. The common butterwort (*Pinguicula vulgaris*) is abundant in the northern parts of Great Britain and Europe. It has the power of coagulating milk. The Laplanders pour reindeer-milk warm from the animal upon the leaves of this plant, strain it, and set it aside for two or three days, till it acquires the consistence of cream and some degree of acidity, when it is with them a favorite article of food. A little of it in this state will produce the same effect on warm reindeer-milk which was at first produced by the leaves of the plant. The origin of the English name, butterwort, is sometimes referred to the power of coagulating milk, sometimes to the peculiar texture of the leaves.

BUTTERWORTH, HEZEKIAH (1839—). An American editor, juvenile writer, and poet. He was born at Warren, R. I., December 22, 1839. After a common-school education, Butterworth traveled widely in America and Europe, and became (1871) editor of *The Youth's Companion*. Among his popular juvenile books are: *Zigzag Journeys* (1876-90); *A Knight of Liberty; The Boyhood of Lincoln; The Patriot Schoolmaster;* and *The Wampum Belt* (1896). He has published, also, *Poems for Christmas, Easter, and New Year* (1883); *Poems and Ballads* (1887), dealing with American history; and *Songs of History* (1887).

BUTTMANN, bōōt'mȧn, PHILIPP KARL (1764-1829). An eminent German classical scholar. He was born in Frankfort-on-the-Main, and studied in Göttingen under Heyne. He became, in 1789, assistant in the Royal Library in Berlin, and rose successively to be secretary and librarian (1811). He held at the same time (1800-08) a professorship in the Joachimsthal Gymnasium in Berlin, which he afterwards exchanged for a professorship in the newly founded university of that city. He died June 21, 1829. Buttmann is best known by his Greek grammars, the *Griechische Grammatik* (22d ed., 1869), and his *Griechische Schulgrammatik* (14th ed., 1862). His *Lexilogus* (2d ed., 1860) is a study of the difficult words in Homer and Hesiod. His other important works are: *Ausführliche griechische Sprachlehre* (1819-27); editions of selected dialogues of Plato; Demosthenes *In Midiam;* Sophocles's *Philocetes, Aratea,* and *Scholia to the Odyssey*. Valuable, also, was his *Mythologus* (1828-29), a collection of essays on myths of the ancients. He continued the great edition of Quintilian begun by Spalding.

BÜTTNER, but'nĕr, KARL GOTTHILF (1848—). A German missionary and linguist, born in Königsberg. He studied theology at the University of Königsberg, in 1872-80 worked under commission of the Rheinische Missionsgesellschaft in Damaraland, and at the same time conducted a school for native teachers at Otyimbingwe. From 1886 to 1889 he was inspector of the Ostafrikanische Missionsgesellschaft in Berlin, and in 1887 was appointed an instructor in the Seminary for Oriental Languages. He published a *Sprachführer für Reisende in Damaraland* (1888); a *Wörterbuch der Suahelisprache* (1891); and *Lieder und Geschichten der Suaheli* (1893).

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BUTTON (Fr. *bouton*, bud, button, knob, literally, something pushing out, from *bouter*, to push; cf. Engl. butt). A term applied to the well-known appendages to dress used either for fastening or for ornament; to a sort of oblong latch used by joiners and cabinet-makers for fastening the lids of boxes, doors of closets, etc.; and in technical language, to the mass of fused metal found at the bottom of a crucible or cupel after fusing or assaying.

The use of buttons as an article of dress is a product of modern civilization, as savages employ strings to fasten their clothing together. The Greeks and Romans also employed strings and girdles, the loose, flowing nature of their garments not requiring a more secure fastening. Buttons were first fastened to the clothing for ornamental purposes. The next step was the use of loops and buttons, the evolution of the buttonhole coming last of all. Buttons were first employed in southern Europe in the Thirteenth or Fourteenth Century, and the manufacture of buttons in England dates only from the reign of Elizabeth as a trade of any importance. It has undergone several extraordinary changes, produced chiefly by the ever-varying fashions in dress; but also by some simple, though ingenious, inventions, as well as by foreign competition. In Great Britain, Birmingham has always been the principal seat of the button manufacture. What has been called the 'Augustan Age' of button-making in that city included the latter portion of the Eighteenth and the early part of the Nineteenth centuries, when it was the fashion to wear coats 'loaded with innumerable gilt buttons,' and when employers on a moderate scale in this manufacture were making incomes of from £2000 to £3000 a year, and their workmen from £2 to £4 per week.

There are, in general, three kinds of buttons: Those which are sewed to the garment through holes in the button itself; those which have shanks of metal; those which have, in place of the metal shank, a tuft or layer of felt or other cloth. The last two kinds are usually made on the shell plan, there being two plates of metal with a filling of pasteboard or cloth between, each having the edges turned back, and the one securely pressed into the other by machinery. The face of the button may be covered with cloth or may be of decorated metal. The back has a hole or collet in the centre, through which the metal shank or cloth tuft is introduced. The shell button was invented by B. Sanders, a Dane, who, in 1807, moved from Copenhagen to Birmingham, and there began the manufacture of buttons. He used a metal shank, and his son introduced the cloth tuft in its place. A further modification of the button was made later, when in place of the tuft a thin layer of cloth was secured by a metal plate to the back of the button, which was to be sewed on by means of this loose layer of cloth. At the close of the Nineteenth Century the tendency of fashion was to abandon in a considerable degree the shell button, and to return to the older form with two, three, or four holes. Shanks, when used, are often fastened directly to a solid button, especially if it be of metal.

Among the other materials which have had a great success in their day, it is found that buttons made of hoof, under the name of 'horn buttons,' originally introduced more than a half-century ago by E. Bassot of Paris, were for a good many years most extensively manufactured at Birmingham and sent to all parts of the world. The hoofs are first boiled in large kettles and then cut into fragments. These are shaped into buttons, which are then placed under a hydraulic press to stamp various patterns on them. Another machine bores the holes, and still another polishes them. An average factory produces from 1500 to 2000 gross per week.

Vegetable ivory has long been a favorite material for the manufacture of buttons, because it is readily dyed and turned in the lathes. (See ATTALEA.) It is the fruit of a South American palm called the coroza-nut, and resembles in appearance true ivory, though somewhat softer. The nuts cost in France, in 1899 (according to a United States consular report), from $3.81 to $5.71 per 100 kilograms (220 pounds). The nuts are first shelled by means of a rotary sheet-iron drum, provided on the interior with sharp, three-edged irons. The nuts are then cut into halves, out of which buttons are bored, or into blocks which are formed into buttons by a shaping machine. The dyeing process requires much skill and chemical knowledge, and each factory has its carefully guarded secrets. The buttons are dried in wire trays, where they are subjected to a certain degree of heat. They are then polished by means of a large, revolving, felt-lined barrel, by polishing stones, and by hand.

Metal buttons are a numerous class, and include buttons for uniforms, trouser buttons, fancy buttons, which are gilt, stamped, chased, or enameled, and many cheap varieties in iron and other metals. Numerous kinds of composite buttons are also partly composed of metal. Glass buttons form another interesting branch, as do also porcelain buttons. Vulcanite buttons have been very extensively made in the United States. As to other materials, a Birmingham manufacturer once said it would be easy to write out a long list from which buttons have been made, but very difficult to name one from which they have *not* been made. In making metal buttons, circular disks, called 'blanks,' are first cut out of sheet brass or other metal by means of fly-presses, usually worked by girls. The fly-press consists of a vertical iron screw with a triple thread, to which screw is attached a horizontal arm, bending downward at the end to form a handle. A punch attached to the press rises and falls with the motion of this handle, and rapidly cuts out the blanks. When large quantities of one pattern are required, a self-feeding, self-acting machine is used, which cuts out the blanks in rows at one blow. After being annealed, the blanks are next made convex by a blow from a stamp. The shanks are formed of wire by a separate machine, which cuts off pieces and bends them into loops of a required form. When these are soldered on, the buttons are dressed on a lathe. They are then gilded and burnished; some, however, are only lacquered; and some, though gilt, are finished in a dead or frosted style. Livery and other buttons having a device in

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strong relief are stamped by a die placed in a stamping-press. See DIES.

Buttons with holes, when of pearl-shell, bone, wood, or ivory, are cut with a tubular saw, turned separately in a lathe, and drilled. When of metal the blanks are punched, then stamped in dies to the required form; the holes are punched and finished smooth, so as to round the sharp edges that would otherwise cut the thread. Glass buttons are usually made by taking a rod of glass of any color, softening the end by heat, and pressing it into a mold, each half of which is fixed to one limb of a pair of pincers. The shank is placed in a hole in the mold before the melted glass is inserted.

The manufacture of pearl buttons was introduced into the United States about 1855. The raw material at first came from China, and entered free of duty. In Bohemia and elsewhere such buttons are manufactured in families and by the poorer classes often as a house industry in which all members of the family can engage, the smaller children sewing the buttons on cards. In Austria, France, and Germany the work has largely been done by convicts. The shells are brought from the Red and Mediterranean seas, and there is said to be great danger that the beds will be exhausted, as it takes them twenty years to mature.

During the last decade of the Nineteenth Century the manufacture of pearl buttons in the United States received a great impetus, owing to the discovery of fresh-water mollusks in the Mississippi River admirably adapted to this use. Of the 400 species of mussels found in the river, several varieties are suitable for button manufacture, but the best is the *Quadrula ebena*, or 'nigger-head,' which has a very thick shell, a black or dark-brown outside skin, and a glistening white interior. The fishing is conducted throughout the year, even in the coldest weather, under the ice, when shells are in best condition, being less brittle. On account of the shallowness of the river, fishing is extremely easy, and is carried on so unceasingly, even during the spawning season, that unless measures are taken to regulate the matter, the banks will inevitably be exhausted. Another enemy to the life of the mollusks is the sewage pollution of the river. After the shells are purchased from the fishermen, they are soaked in barrels of fresh water from three to six days, to render them less brittle. They are next sawed into blanks with saws formed by steel strips bent into tubular form. A fine spray of water plays on the shell, to keep it cool and lessen the dust, which is very irritating to the respiratory organs. The back of the button is then ground, to remove the skin and even the surface, and the front is polished and the depression made by means of an emery wheel. The holes are then drilled, and the buttons are ready for sorting, carding, and packing. The manufacture of buttons in the Mississippi Valley began at Muscatine, Iowa, in 1890. It is now the principal business along a section of the river over 200 miles in length, extending from Fort Madison, Iowa, to Sabula, Iowa. In 1898, 7000 tons of mussels were used, at a cost of $72,000; the manufactured output consisted of 2,250,000 gross of buttons, at a market value of $500,000. The unit of measure in button manufacture is a line, or one-fortieth of an inch, and it is stated that—in the United States at least—the cost of manufacture varies pretty directly with the diameter or number of lines of the button. The whole subject of the pearl-button industry of the Mississippi Valley was investigated in 1899, by the United States Fish Commission, from whose reports much information concerning the industry can be obtained.

An interesting account of the development of the button industry in the United States will be found in Bulletin No. 172 of the Twelfth Census of the United States. It is here stated that brass buttons were manufactured in Philadelphia as early as 1750, and, soon after, the manufacture of hard-wood buttons was begun by Benjamin Randolph in the same city. The first button-factory in Waterbury, Conn., which city is now the centre of the metal-button industry, was established about 1800. The manufacture of covered buttons by machinery instead of by hand was begun in 1827 by Samuel Williston, of Easthampton, Mass. Horn buttons were made as early as 1812, the hoofs of cattle forming the raw material. Vegetable-ivory buttons have been made in the United States since 1859, and this branch now ranks third in the button industry. Various kinds of composition buttons have been made since the industry was started at Newark, N. J., in 1862, where a button resembling vegetable ivory was produced from certain fossil and vegetable gums, combined with finely comminuted carbonate of lime, feldspar, or mica. Composition buttons are now made of many materials, among them the Irish potato, which, when combined with certain acids, becomes as hard as stone. Other materials are the casein from skim milk, blood, and brown sea-weed. Prior to 1900, 348 patents for button-machines and 1355 for the making of buttons had been issued by the United States Patent Office. A unique branch of the button industry is the manufacture of campaign and society buttons, and of buttons on which photographs are reproduced. These are usually made from celluloid.

The centres of the different branches of the button industry in the United States are as follows: Bone buttons, Pennsylvania; brass buttons, Connecticut, New York; cloth buttons, Massachusetts; composition buttons, Pennsylvania, New York; fresh-water pearl-button blanks, Iowa, Illinois; fresh-water pearl buttons, New York, Iowa, Pennsylvania; horn buttons, Connecticut; ocean-pearl buttons, New York, New Jersey, Pennsylvania; paper buttons, New Hampshire; tin buttons, New Jersey; vegetable-ivory buttons, New York, Massachusetts, New Jersey. In 1850, according to the Census Bulletin named above, 59 button-making establishments in the United States had an output valued at $964,359, while in 1900 the 238 establishments reported valued their productions at $7,695,910. The value of imported buttons declined from $2,176,046 in 1891 to $600,982 in 1900.

In China a knob, or so-called button, is worn in the hat as a sign of rank, there being nine ranks, each of them signified by the material of which the button is made. The highest rank is indicated by a ruby; second by a coral; third, a sapphire; fourth, lapis lazuli; fifth, crystal; sixth, white stone; seventh, plain gold; eighth and ninth, differently marked gold.

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BUTTON, Sir THOMAS (? -1634). An English navigator, the successor of Sir Henry Hudson in the search for a northwest passage. In 1612-13 he was frozen in and wintered on the west coast of Hudson's Bay. The next summer he explored that coast, returning to England in the autumn.

BUTTON QUAIL. A peculiar quail-like bird of the genus Turnix, family Turnicidæ, order Hemipodii (q.v.), found in the tropical and sub-tropical portions of the Old World. It is also called bustard quail, bush-quail, ortygan, and hemipode. About twenty species are known, one of which — the torillo of Spain (*Turnix sylvatica*) —occurs in southern Europe. They are almost the smallest game birds known, and frequent wooded places, in small coveys, feeding on seeds, berries, and insects, and frequently visiting plantations. The females are more brightly colored than the males, and more forward in their manners than is usual among birds; and their extreme pugnacity is taken advantage of in India in trapping them by the help of a decoy, which they try to assail.

BUTTON'S COFFEE-HOUSE. A famous place of assemblage for wits in Addison's time, situated in Russell Street, Covent Garden, London.

BUTTONWOOD. See PLANE.

BUTTRESS (OF. *bouterets*, from *bouter*, *boter*, to thrust). A structure, usually in the form of a pier, erected for the purpose of giving additional stability to a wall. It is not particularly necessary, except in vaulted construction, so little trace of it is found in Egyptian or Greek art. As its purpose is to balance the outward pressure or thrust, it was not required in the concrete Roman structures, where the pressure, as in a casting, was only downward. The use of buttresses begins in Byzantine architecture (see BYZANTINE ART), is continued in Romanesque (see ROMANESQUE ARCHITECTURE), and receives its complete and logical development in Gothic (see GOTHIC ARCHITECTURE), for these styles used a system of balanced thrusts. This balance was at first largely secured without buttresses, which are useful only where the pressure is concentrated at certain given points, which the buttresses are used to strengthen. For instance, in a Romanesque tunnel-vaulted church, the thrust of the high vault of the nave is continuous, and is met, say, by semi-tunnel vaults over the aisles, whose outline is like that of the later Gothic flying buttresses—like a continuous flying buttress. Buttresses are of four main varieties: (1) Internal; (2) external; (3) pier buttresses; (4) flying buttresses. In Saint Sophia, at Constantinople, two enormous pier buttresses brace the central dome on either long side, doing what the semi-domes perform on the other sides; but the main strain is passed down toward the ground by a skillfully arranged series of vaults over galleries, aisles, etc. In other and less bold Byzantine constructions, all the buttressing is internal. As early as the Romanesque period there is a stronger tendency to reveal structural methods on the outside. The use of external buttressing in the form of piers became then very common, but they remained secondary in usefulness to the aisle vaulting, in resisting the pressure of the nave vaulting, and their capability by increased projection to strengthen the outer walls was not thoroughly utilized. But when, as in Norman Romanesque, ribbed cross-vaulting was adopted, which concentrated the thrusts on the piers and on the points in the walls opposite them at the base of the vaulting compartments (see VAULT), then the buttress was enabled to fulfil its real function. The Gothic framework which then developed was composed of three interacting parts, which secured a perfect equilibrium: (1) The cross-ribbing of the vaults; (2) the supporting piers; (3) the retaining buttresses. These Gothic buttresses consisted of two parts—pier and flying arch. The flying buttress was a purely Gothic invention. Suppose a five-aisled Gothic cathedral, with buttresses outside opposite the fall of each vaulting compartment, and occupying substantially all the space between the large stained-glass windows. A heavy buttress pier rises from the ground, projecting from the outer aisle wall to a point about opposite the base of the vaulting of the nave. It is divided into three stories—the first is part of the outer aisle wall, and receives its vault thrust directly: the second is joined to the upper part of the wall of the gallery, over the inner side aisle, by a flying half arch abutting against its pier buttress; the third is joined in the same way by a longer arch to the base of the vault of the main nave. These flying arches receive the thrust and transmit it along the line of greatest resistance to the main pier buttress. The development of this system by Gothic architects is one of the most interesting details of the style. The earliest examples—in about 1140, at Saint Germer—are low and ineffective; they increase in height and heaviness as the Twelfth Century advances (Esserent, Noyon); and toward 1200 architects know just what form, position, and size are the most effective. They are then able to reduce them in bulk, the more skillfully they use them, and they begin to use for decorative purpose what would seem likely to be an awkward blemish on the exterior of their buildings. A comparison of the buttresses of the cathedrals of Soissons, Notre Dame, Amiens, and Rheims will show how this was managed during the course of the Thirteenth Century in France. Colonnettes against the piers, pinnacles and finials as a crown, tabernacles, engaged shafts and blind arcades, gargoyles and grouped moldings, contributed, together with increased elegance of form and harmony of proportions, to make the developed Gothic buttress a beautiful detail, as well as the most vital part of Gothic structure, by which heavy walls were rendered unnecessary. On French façades, the four great piers that divide them into three sections are buttresses, though other Gothic schools besides the French used the buttress; but as they did not develop it nor thoroughly grasp its function in all its delicacy, they used it less successfully and generally. The Spanish school follows the French most closely, but often omits the secondary pier buttress (cathedral at Burgos). Next in purity comes the English, where sometimes, as at Westminster, an approach is made to French perfection. Then comes Germany, at a great distance; while in Italy, with its defective grasp of constructive principles, the

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Gothic buttress is used in two or three cases only (e.g. Frari, Venice). Since the Gothic period the buttress has been practically eliminated. The Renaissance returned to the Roman method of concealed balance of thrusts, and the same method was followed by subsequent styles.

BUTURLINOVKA, bōō-tōōr'lē-nôf'kâ (originally the estate of Count Buturlin), or PETROVSKOYE. A village in the Government of Voronezh, Russia, 35 miles southeast of Bobrov. It has a number of tanneries, flour-mills, and brickyards. Population, 1897, 23,400.

BUTYRIC ACID (Lat. *butyrum*, butter; see BUTTER), $C_4H_8O_2$. One of the so-called fatty acids. It is an important constituent of butter, in which it exists in the form of a glyceride —i.e. an ester of glycerin. The free acid has a disagreeable odor similar to that of stale sweat, in which it is found in small quantities. It is a thick liquid, somewhat lighter than water, and boiling at 163° C. It mixes with water in all proportions. It is usually prepared by a double process of fermentation. First, milk-sugar is exposed to the action of the *lactic ferment* present in the air, which transforms the sugar into lactic acid. The lactic-acid solution thus obtained is then subjected to the action of another ferment, the *butyric ferment*, present in decaying cheese; and by this second process of fermentation the lactic acid is gradually transformed into butyric acid, provided the solution is kept neutral by the addition of chalk. The butyrate of lime thus obtained is decomposed with dilute hydrochloric acid, and the free butyric acid is separated by distillation. Butyric acid may also be prepared from butter by boiling (saponifying) with caustic potash. The acid called *isobutyric acid* has the same molecular composition as butyric acid, though the two differ distinctly in their physical and chemical properties; thus isobutyric acid boils at 155° C., and, unlike butyric acid, has a limited solubility in water. The constitutional formula assigned to butyric acid is $CH_3.CH_2.CH_2.COOH$; that assigned to isobutyric acid is $(CH_3)_2CH.COOH$.

BUTYRIC ESTER, or PINEAPPLE OIL. An exceedingly fragrant oil obtained by distilling a mixture of butyric acid, alcohol, and sulphuric acid. The butyric ester which passes over is generally mixed with alcohol, and sold in commerce as *artificial pineapple oil*. Its odor resembles that of pineapples. The substance is used in the manufacture of fruit candy and in perfumery. In its formation, ordinary alcohol (C_2H_5OH) combines with butyric acid (C_3H_7COOH), according to the following chemical equation:

$$C_2H_5OH + C_3H_7COOH = \underset{\text{Butyric ester, or Ethyl butyrate.}}{C_3H_7COOC_2H_5} + H_2O$$

See also ESTERS.

BUXTEHUDE, bŭks'te-hōō'de, DIETRICH (1637-1707). A noted German organist and composer, born at Elsinore, Zealand, Denmark. Nothing is known regarding his musical training. He must have achieved a considerable reputation by 1668, for in that year he was appointed organist of the Marienkirche of Lübeck, at that time one of the most important posts of the sort in Germany. There he exercised a powerful influence upon the musical history of his time. Not only was he distinguished as an organist, but he established the 'Abendmusiken,' famous throughout Germany even into the Nineteenth Century. These were services, comprising organ music and concerted works for chorus and orchestra, given annually in the Marienkirche, on the afternoons of the five Sundays preceding Christmas. It is recorded that to hear these performances in 1705 Bach walked 50 miles, from Arnstadt to Lübeck, where he prolonged his month of leave to three months. Buxtehude was surpassed in the choral by the Pachelbel (q.v.) school, but he was eminent as a pioneer in purely instrumental music, later carried to its full development by Bach. Many of his compositions have been lost. Fourteen *Choral-Bearbeitungen* have been edited by Dehn (Leipzig), and the organ works that are still extant by Spitta (2 vols., Leipzig, 1876-78). Various separate pieces have appeared in Busby's *History of Music* (London, 1819); Commer's *Musical Cacra* (26 vols., Berlin, 1839 et seq., Vol. I.); Ritter's *Kunst des Orgelspiels* (Leipzig, 1877); and other works.

BUXTON (AS. *boc*, Ger. *Buche*, Scotch, *buck*, Engl. *beech* + AS. *tun*, Engl. *town*). A market-town and watering-place in Derbyshire, England, 33 miles northwest of Derby (Map: England, E 3). It lies 900 feet above the sea, in a deep valley, surrounded by hills and moors, which have been tastefully planted, the only approach being by a narrow ravine. Buxton is famous for its calcareous springs, tepid (82° F.) and cold (discharging 120 gallons of water per minute), and its chalybeate springs. It is visited annually from June to October, by 12,000 to 14,000 persons, the waters being taken for indigestion, gout, rheumatism, and nervous and cutaneous diseases. There is a small industry in ornaments made from alabaster and spar. Buxton is in direct railway communication with London, 160 miles distant. Near Buxton are Diamond Hill, famous for its crystals, and Poole's hole, a stalactitic cavern about 560 yards long. About five miles east of Buxton is Chee Tor, a perpendicular limestone rock 300 feet high. Population, in 1891, 7540; in 1901, 10,181. The Romans had baths here. Mary Queen of Scots resided for some time at Buxton when in the custody of the Earl of Shrewsbury.

BUXTON, JEDEDIAH. See CALCULATORS, REMARKABLE.

BUXTON, Sir THOMAS FOWELL (1786-1845). An English philanthropist. He was born at Earl's Colne, Essex, the eldest son of a wealthy family. At his graduation from Trinity College, Dublin, at 21 years of age, he was asked to represent the University in Parliament, but declined. He married a sister of the celebrated Mrs. Elizabeth Fry in 1807, entered business as a brewer, and by his energy and great business ability ultimately accumulated a large fortune. He at once interested himself, also, in local charities, and in educational and religious enterprises. In 1818 he entered Parliament as member for Weymouth, which he continued to represent for about twenty years, taking a prominent part in all debates on such questions as the amelioration of criminal law and of prison discipline, the suppression of the suttee in India, and the emancipation of slaves. The latter, in particular, engrossed a large share of his activity

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for many years, and no one displayed more indomitable zeal and firmness in its advocacy. In 1837 he was rejected by his constituency, and refused ever after to stand for a borough. In 1840 he became a baronet. For his life, consult *Memoirs of Sir T. F. Buxton, Bart.*, edited by his son, Charles Buxton (London, 1872).

BUXTORF, bụks'tôrf, JOHANN, THE ELDER (1564-1629). A German Orientalist. He was born at Kamen, Westphalia, December 25, 1564. His student years were spent at Marburg, Herborn, Heidelberg, Basel, Zurich, and Geneva, and after traveling through Germany and Switzerland he settled at Basel, where he became professor of Hebrew in 1591, at the instance of his teacher, Grynæus, and there died of the plague, September 13, 1629.

It was while studying at Herborn under Piscator that he imbibed his love for Hebrew, to the study of which and of Rabbinical literature he devoted his life. He associated much with learned Jews, and so great was his acquaintance with Jewish writings that he was frequently consulted by Jews on matters relating to ceremonial laws. His learning gained for him the title 'Master of the Rabbins.' His most important works are *Synagoga Judaica hoc est Schola Judæorum* (1604); his *Biblia Hebraica Rabbinica* (1618-19); his *Tiberias; sive Commentarius Massorethicus* (1620); his *Lexicon Chaldaicum Talmudicum et Rabbinicum* (1639), a most comprehensive work of which a new edition was issued by Fischer (1866-74); and his *Concordantiæ Bibliorum Hebraicorum* (1632; new ed. by Bär, 1862-63). The two last-named works were, however, not completed by Buxtorf, and were published after his death in completed form by his son, Johann Buxtorf. Consult Kautsch, *Johann Buxtorf der Aeltere* (Tübingen, 1880).

BUXTORF, JOHANN, THE YOUNGER (1599-1664). Son of the preceding, also an Orientalist. He was born at Basel, August 13, 1599. At the age of 12 he entered the University at Basel, and at 16 he received the diploma as Master of Arts from the hands of his father. After finishing his studies he proceeded to Heidelberg and subsequently to Geneva. In 1623 he was offered the chair of logic at Lausanne, but declined, preferring to return to Basel, where, after holding various clerical offices, he was elected, in 1629, to succeed his father at the university. He remained in Basel, holding during his residence various chairs until his death on August 16, 1664. He was married four times; his first three wives dying shortly after marriage. Of his children, all died young except two boys, one of whom, Johann Jacob, succeeded his father in the chair of Hebrew. Much of his life was spent in controversies regarding disputed biblical and theological questions, notably regarding the antiquity of the vowel system in Hebrew. Besides his *Lexicon Chaldaicum et Syriacum*, which appeared (Basel, 1622) with a preface by his father, he completed and published from the MSS. of his father the *Lexicon Chaldaicum, Talmudicum, et Rabbinicum* (Basel, 1639) and *Concordantiæ Bibliorum Hebraicorum* (Basel, 1632).

BUX'US. See Box.

BUYS-BALLOT, bois'bä'lō', CHRISTOPHORUS HENRICUS DIDERICUS (1817-90). A Dutch meteorologist, born at Kloetinge, and educated at the University of Utrecht. He became professor of mathematics in the university (1847), and professor of experimental physics (1870). In 1854 he was appointed director of the Royal meteorological institute at Utrecht. He was the first to make a practical application of a system of storm-signals in Europe and invented the aërochinoscope, used on the Dutch coast to communicate to vessels at a distance the direction from which wind or storm is to be expected. He is, perhaps, best known for the Buys-Ballot Law, a statement expressing the connection of wind-directions with a given storm-centre. He was active in endeavoring to obtain an international uniformity in meteorologic observations. His publications include *Changements périodiques de la température* (1847); *Eenige regelen voor te wachten van weerverandering in Nederland* (1860: "Some Rules Regarding Weather Changes in Holland"), and 40 volumes of the *Annual* of the Meteorological Institute.

BUZAU, bōō'tsou, **BUZEO**, or **BUSEO**. The capital of a district in western Wallachia, Rumania, on the Buzau River, and on the Rumanian-Bucharest Railway. It is an episcopal see, with a cathedral establishment and other public buildings, and has a considerable domestic trade. Population, in 1899, 21,561.

BUZ'FUZ, SERGEANT. A caricature of a contemporary class of barrister in Dickens's *Pickwick Papers*. He is counsel for Mrs. Bardell in her breach of promise suit against Pickwick. His firm has taken up her case thinking that the latter will pay the costs; and when they lose their fees by the defendant's choice of jail instead of blackmail, they very nearly land their own client in prison. Buzfuz is inimitable at showing dark intentions in the most innocent actions and speeches of Pickwick.

BUZULUK, bōō'zōō-lōōk' (founded in 1756 on the *Buzuluk* River). A district town in the Government of Samara, Russia, 110 miles east-southeast of the city of Samara (Map: Russia, H 4). The chief industries include the casting of church bells and the preparation of sheepskins. Population, in 1897, 14,500.

BUZZARD (OF. *buzart*, Fr. *buse*, from Low Lat. *busio*, Lat. *buteo*, a kind of falcon or hawk). A hawk of the genus Buteo, a widely distributed group. They are of medium or rather large size, heavy-bodied, of strong but measured flight. They are not so spirited as the falcons (q.v.) and capture their prey more stealthily. They live very largely on the smaller mammals, such as field-mice and squirrels, but they also often capture birds, and are frequent visitors to the poultry-yard. The wings are rather long and pointed, exceeding the tail; feet robust, with tarsi partially feathered. The type of the genus is the common buzzard of Europe (*Buteo vulgaris*), which measures about four feet across the wings, and is prevailingly brown, with a considerable mixture of black on the upper parts and of white or grayish white on the under. In America this species is replaced by Swainson's buzzard (*Buteo Swainsoni*), which is one of the commonest large hawks from the Mississippi westward to the Pacific. It occasionally strays eastward through the Northern States. In color it is only slightly different from the European species, but it is somewhat larger. Some nine or ten other buzzards occur in the United States.

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but only two or three of them are widely distributed. The most common of these is the red-tailed hawk (*Buteo borealis*), found over all North America. The tail of the adult bird is a rich rufous, tipped with white and with a narrow black band near the tip. The red-tail is one of our largest hawks, measuring from four and a half to five feet across the wings. Though often called the 'hen-hawk,' he seldom attacks poultry, and feeds largely on frogs and insects, as well as mice and squirrels. The nest is a large affair of sticks built in a tree from 30 to 70 feet from the ground. The eggs, laid very early in the spring, are usually three or four in number, dull white, somewhat marked with brown. Closely allied to the red-tail is the red-shouldered hawk (*Buteo lineatus*), a somewhat smaller bird, and easily recognizable by the rufous wing coverts, forming a bright patch at the bend of the wing. The red-shouldered hawk has about the same range as the red-tail and is often confused with it under the names 'hen-hawk' and 'chicken-hawk,' but poultry is really a very insignificant part of its diet. Its breeding habits are similar to those of the red-tail. The broad-winged hawk (*Buteo latissimus*) is much smaller than either of the preceding, and is confined to the eastern part of the continent. It feeds very largely on insects.

The name is often extended to the genus of which the rough-legged hawk (*Archibuteo lagopus*) is the best-known species. These buzzards are easily recognized by the feathered tarsus, the feathers extending clear to the toes in front. The rough-leg is one of the most wide-ranging hawks known, being found in the Old World from Lapland to the Cape of Good Hope, and in America as far south at least as Virginia. It is somewhat darker than the European and is ranked as a separate subspecies. (See Plate of EAGLES AND HAWKS.) In the western part of North America is found a closely allied species, the 'California squirrel-hawk,' which is considered "one of the largest, handsomest, and most distinctively marked hawks of North America." Besides these various buzzards already mentioned, about twenty other species are known, found in all parts of the world. In America, the name buzzard is commonly given to the American vultures, of which the common turkey-buzzard (q.v.) is the most familiar example.

BUZZARD, MR. JUSTICE. An ignorant and corrupt judge in Fielding's *Amelia*.

BUZZARD-EAGLE. See EAGLE.

BUZZARD'S BAY. A bay on the south coast of Massachusetts, about 30 miles long by 5 to 10 miles wide, sheltered from the ocean and partly separated from Vineyard Sound (q.v.) by the Elizabeth Islands (Map: Massachusetts, F 4), which form a portion of the southern boundary. Buzzard's Bay is a favorite summer resort. In the bay are the harbors of New Bedford, Wareham, Sippican, Nasketucket, and Mattapoiset.

BY-BIDDING. A fictitious bidding at an auction sale on behalf of the vendor, at his request or with his connivance, for the purpose of enhancing the price and without the intent of buying. Another name for this practice is 'puffing.' In England, secret by-bidding or puffing by a single bidder will vitiate a sale at an auction advertised as being without reserve. Such appears to be the rule generally prevailing in the United States. When the auction is not announced to be without reserve, there is considerable authority both in England and in the United States for the view that a single puffer will not invalidate the sale, if he is employed to prevent a sacrifice of the property at too low a price, and does not run the price up unduly. The safe and honorable course for an owner, however, who wishes to save his property from sacrifice at auction, is to give notice that he reserves the right of bidding, or of withdrawing the property, if satisfactory bids are not made. An agreement by the vendor to pay the puffer for his services is unenforceable whenever the services are illegal. See AUCTION; CONTRACT.

BYBLOS, bĭb'lŏs (Gk. Βύβλος). An ancient city of Phœnicia, more properly Gyblos, now called Jebeil, situated at the base of the Lebanon, about half way between Tripoli and Beirut. It is frequently mentioned in Phœnician inscriptions under the form G B L and appears in cuneiform documents as early as the Fifteenth Century B.C. as Gubli, in later inscriptions also as Gubal. From the el-Amarna tablets it is evident that it was a place of considerable importance already at a remote period, and was prominently involved in the western campaigns of Tiglathpileser III. and Shalmaneser IV. (Eighth Century B.C.). How the change from initial G to B was brought about is not known, but among Greek writers (e.g. Strabo), it is invariably known as Byblos. Byblos was the seat of worship of Adonis of Tammus and of Astarte under the name of Baalet-Gublu (lady of Gublu or Byblos). The town is called Gebal in the Bible; Ezek. xxvii. 9 mentions the maritime pursuits of the inhabitants. The remains of the town are rich in ruins, dating from Roman times and the period of the Crusades. It was the birthplace of Philo.

BYELINSKI, byĕ-lĕn'skê, VISSARION GRIGORYEVITCH (1810-48). A Russian literary critic. He was born at Sveaborg, the son of a physician. He attended the gymnasium at Penza and studied philology at the University of Moscow, where he became intimate with the 'idealist' circle of Stankyevitch, Herzen, and others. In 1832, on account of a tragedy directed against serfdom, he was expelled from the university, ostensibly on the ground of 'incapacity.' In 1834 he made his début with the famous *Literary Reveries*—a brilliant survey of the historical development of Russian literature—in *Rumor*, and contributed to it and the *Telescope* until their suppression in 1836. Two years later, with several friends, he undertook to edit the Moscow *Observer*. Under the influence of Bakunin and a one-sided interpretation of Hegel's proposition: 'all that exists is rational,' he preached complete acceptance of and conciliation with reality. At the same time he advocated the theory of pure art, which aimed at an artistic embodiment of 'eternal ideas' and not at a reproduction of life. In 1839 he went to the capital and became principal contributor of the *Annals of the Fatherland*. 'Reality' soon frightened him here, and all the fiery striving for truth and right now turned into deep grief over this reality. From 1840-46 he wrote a series of long essays on Derzhavin, Lermontoff, Gogol, Koltsoff, Pushkin (the last a volume of over 600 pages), and other popular writers, the whole forming practically a history of Russian litera-

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ture from Lomonosoff down to his own day. Byelinski's critiques now acquired a social character, and he appeared not only as a keen æsthetic judge, but as a passionate critico-publicist as well, fighting for personal rights, unmasking social and literary hypocrisy, scourging stagnation, routine, and lack of humaneness in society. In 1846 he began to contribute to the *Contemporary*, rejuvenated under the editorship of the poet Nekrasoff. His last great effort was his *Literary Review for the Year 1847*, in which he saw the hope of Russian literature in the 'naturalistic' works of Turgenieff, Gontcharoff, Dostoyefski, and others. His health was undermined, and the trip abroad could not delay the progress of consumption, which brought him to the grave on the eve of his arrest by the police on account of his radical views.

A perfect master of style, passionate, and endowed with a brilliant fancy, with a natural bitterness greatly increased by physical ailing and the hardships of life, he poured all his heart and soul into his work. Greeting with ardent delight the appearance of every new gifted writer, he unerringly foretold his future development, basing his opinion upon a careful analysis of his work. Besides giving correct estimates of all the chief Russian writers and bringing down the history of Russian literature to certain well-defined periods, he was the first Russian to establish right conceptions of art and literature, and to point out the direction which literature must take to become a social force.

His works, in twelve volumes, were published in 1859-62, and later. In 1898, after the copyright ceased, several new editions appeared. The best is now (1902) in the course of publication, with profuse notes by S. Vengeroff (to be in twelve volumes). Consult A. Pypin, *Byelinski: His Life and Correspondence* (Saint Petersburg, 1876).

BYELOSTOK, byâ'lô-stôk'. See BIALYSTOK.

BY'ERLY, WILLIAM ELWOOD (1849—). An American mathematician. He was born in Philadelphia, Pa., and in 1871 graduated at Harvard. He was assistant professor at Cornell (1873-76), and since then has been at Harvard, first as assistant professor, and then, after 1881, as full professor of mathematics. He became a Fellow of the American Academy of Sciences in 1878, and has published *Elements of Differential Calculus* (1879); *Elements of Integral Calculus* (1881); a *Treatise on Fourier's Series and Spherical, Cylindrical, and Ellipsoidal Harmonics;* and *Problems in Differential Calculus* (1895).

BYERLY TURK, THE. The sire of the Herod race-horse stock, ridden in the Irish Rebellion of 1689, by one Captain Byerly and named after him. He was one of the triad from which all English thoroughbreds mentioned in the studbook are traced. See GODOLPHIN BARB.

BY'FORD, WILLIAM HEATH (1817-90). An American physician. He was born in Eaton, Ohio, graduated at the Ohio Medical College in 1844, and became professor of anatomy in the Evansville (Ind.) Medical College in 1850. In 1857 he was appointed professor of obstetrics and diseases of women and children in the Rush Medical College (Chicago), where he became professor of gynecology in 1880. He was president and professor of clinical surgery in the Women's Hospital Medical College from its organization in 1862 until 1880; was twice president of the American Medical Association; and was president of the American Gynecological Society. Among his works, the best-known are: *Surgery Applied to Diseases of Women* (1865, 2d ed. 1871), and *Philosophy of Domestic Life* (1868).

BY'INGTON, EZRA HOYT, D.D. (1828-1901). An American Congregational scholar. He was born at Hinesburgh, Vt., September 3, 1828, graduated at the University of Vermont, 1852, and at Andover Theological Seminary, 1857; was pastor in various places. He wrote *The Puritan in England and New England* (Boston, 1896, 4th ed., 1900); *The Puritan as Colonist and Reformer* (1899); also the histories of the Congregational churches at Hinesburgh, Windsor, and New Haven, Vt.; a memorial of Rev. E. Cutler, D.D., and a volume of sermons, *The Christ of Yesterday, To-Day, and Forever* (1897). He died at Newton, Mass., May 16, 1901.

BY-LAW (probably on the analogy of *by-path, by-way*, corrupted from *byrlaw;* see BYRLAW). As the term itself indicates, it was first applied to the local rules or laws of a township, manor, or vill, but, as used at present, the term includes all rules or regulations made by public or private corporations, or even by unincorporated societies, for their own management or for the government of their members. The power to make and to change its by-laws belongs to every corporation, even without an express grant of authority. When the power is conferred by charter, or by a general statute, upon particular persons, such as a board of directors, it can be validly exercised only by such persons. In the absence of any limitation, however, the power belongs to the members at large. A by-law which is repugnant to a constitutional provision or to a settled rule of law, or which is unreasonable, is invalid. A valid by-law of a municipal corporation (or ordinance, as it is usually called in this country) is a true law, for it has the authority of the State behind it. A breach of it subjects the offender, generally, not only to an action for a penalty, but to a criminal prosecution. By-laws of private corporations or of unincorporated societies are rather agreements binding on the members, than laws, in the true sense of that term. Consult the authorities referred to under CORPORATION; ULTRA VIRES; and also Boisot, *By-Laws of Private Corporations* (2d ed., Saint Paul, 1902); Pollock and Maitland, *History of English Law* (2d ed., Boston, 1899).

BYLES, bîlz, MATHER (1706-88). A New England clergyman and poet, distinguished for wit and repartee. He was born in Boston, March 26, 1706, graduated at Harvard in 1725, and after being ordained to the ministry, received charge, December 20, 1733, of the Hollis Street Congregational Church, Boston. He was distinguished as a pulpit orator, and his published sermons show a considerable command of language. He corresponded with Pope and Swift, and wrote a *Poem on the Death of George I.* (1727); a *Poetical Epistle to Governor Belcher on the Death of His Lady* (1736); and *Miscellaneous Poems* (1744), which were lauded by his contemporaries to an extent that now seems ludicrous. Byles was a consistent Tory, and in 1776 left his parish on that account. In 1777 he was denounced as an enemy of his country, tried, and condemned to imprisonment and banishment, but

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he was suffered to remain in his own house, "guarded, regarded, and disregarded," as he said, and lived in Boston till his death (July 5, 1788), bequeathing his Royalist sympathies to his daughters. His son, Mather (1736-1814), also a clergyman, became an Episcopalian in 1768, and on the founding of Saint Johns, New Brunswick, by the Tories, who had been expelled from Boston, became their rector till his death (1814).

BYLINA, bĭ-lē'nȧ (Russ., the past, from *byti*, Skt. *bhū*, to be, as it is historical in character). The epic songs of Russia, covering a period from mythological to comparatively modern times. Their heroes, *bogatyri* (paladins), are either mythical, types of the forces of nature, or historical personages. The former, the so-called 'elder paladins,' occupy a small part of the epic songs, the bulk of them dealing with the latter, or 'younger paladins.' In the cycle of 'younger paladins,' aside from the minor portion dealing with the later Moscow period, two main earlier sub-divisions are distinguished: one clustering around the Southern capital, Kiev, and its Prince Vladimir, the other around the free city of Novgorod. The central figure in the Kiev period is Ilya Muromets (q.v.). The *bylinas* have been collected from bards in the northern part of Russia and in Siberia, particularly in the governments of Olonets, Arkhangelsk, and Tomsk. Consult: Rambaud, *La Russie épique* (Paris, 1876); Wesselofsky, "Beiträge zur Erklärung des russischen Heldenepos," *Archiv für slavische Philologie*, Vol. III. (Berlin, 1879); *Epic Songs of Russia*, translated by Isabel Hapgood (New York, 1886).

BYLLYNGE, bĭl'lĭng, EDWARD (? -1687). An English Colonial proprietor. With John Fenwicke, he purchased in New Jersey an extensive tract of land, including that part of the province north of an imaginary line drawn from Burlington to Barnegat. A quarrel regarding the division of the land having somehow arisen between these Quaker associates, William Penn, as arbiter, adjudged nine-tenths of the total property to be Byllynge's. Byllynge, however, soon made an assignment in favor of his creditors, and his holding, long styled the 'Byllynge tenths,' was disposed of to two organizations of the Society of Friends. In 1677 he was elected Governor of West Jersey Province.

BYNG, bĭng, GEORGE, Viscount Torrington (1663-1733). A British admiral, born at Wrotham, Kent, January 27, 1663. He entered the navy at the age of 15, and was rapidly promoted. In 1688 he gained the favor of the Prince of Orange by activity and zeal in his cause, and received the rank of captain. In 1703 he was made Rear-admiral of the Red. The attack on Gibraltar was confined to his command, and for gallant conduct at Malaga he was knighted by Queen Anne. In 1706 he was elected to Parliament, and represented Plymouth until 1721. In 1708 he became Admiral of the Blue, and commanded a squadron fitted out to oppose the Pretender's intended invasion of Scotland from France. He pursued the French fleet to the Firth of Forth, took one ship, and forced the fleet back to Dunkirk, on which occasion he was presented with the freedom of Edinburgh. On the breaking out of the Rebellion of 1715, he was appointed commander of a squadron in the Downs, and for important services against the French, was created a baronet. In 1718 he commanded the English fleet sent to Sicily for the protection of the neutrality of Italy, and gained a striking victory over the Spanish fleet off Messina. Soon after he was appointed treasurer of the navy and rear-admiral of Great Britain. In January, 1721, he became a privy councilor, and in September following was created Baron Southill and Visçount Torrington. On the revival of the Order of the Bath, in 1725, he was installed one of the knights, and on the accession of George II. was nominated first Lord of the Admiralty. He held this office till his death, January 17, 1733.

BYNG, JOHN (1704-57). A brave but ill-fated British admiral, fourth son of Admiral George Byng, Viscount Torrington. He entered the navy early, served under his father in 1727, became captain, and by 1748 attained the rank of Admiral of the Red. In 1756 he was promoted Admiral of the Blue, and appointed to command a hastily equipped squadron of ten ships, sent to the relief of Minorca, at that time blockaded by a French fleet under La Galissonière. On the 20th of May Byng gave the signal to engage, which was obeyed by Rear-Admiral West, but Byng, through ill manœuvring, failed to support him, and the French, acting on the defensive, remained victors. Byng did not consider himself justified in making other efforts, and left Minorca to its fate. The dissatisfaction in England, when the news arrived, was taken advantage of by the Ministry to divert public odium from their inefficient measures. Byng was tried by court-martial and condemned to death, for a breach of the Twelfth Article of War, but recommended to mercy. Sacrificed to the general indignation, he was shot on board the *Monarch*, at Portsmouth March 14, 1757, meeting his fate with firmness and resignation.

BYNKERSHOEK, bĭn'kērs-hōōk, CORNELIUS VAN (1673-1743). A Dutch jurist, born at Middleburg, in Zealand, May 29, 1673. He studied at the University of Franeker, took the degree of doctor in 1694, and immediately after commenced to practice as an advocate at The Hague. In 1703 he was elected by the States-General a member of the supreme council of Holland, Zealand, and West Friesland, and, in the exercise of his functions, soon had occasion to observe how defective was the common law of the country. With a view to remedy this, he published various works on the civil law, the most important of which was the *Observationes Juris Romani*. In 1724 he was elevated to the dignity of president of the supreme council. His works on international law acquired wide celebrity. The most famous are *De Dominio Maris* (1703) and *Questiones Juris Publici* (1737). In addition to these, he made a digest, under the title of *Corpus Juris Hollandici et Zelandici*, of all the laws of his own country. He died April 16, 1743. A complete edition of his works was published at Geneva in 1761.

BYN'NER, EDWIN LASSITER (1842-93). An American novelist and librarian of the Boston Law Library. His best stories are three historical tales: *Agnes Surriage* (1886), *The Begum's Daughter*, and *Zachary Phips*. Of minor significance are *Tritons* (1878) and *Penelope's Suitors* (1887). *The Chase of the Meteor* is a juvenile. Numerous other works are negligible.

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BYR, bur, ROBERT. See BAYER, KARL ROBERT EMMERICH.

BYRD, bẽrd, WILLIAM (1674-1744). An American author, son of Col. William Byrd, a Colonial official. He was born at Westover, Va., educated in England for the law, and, on his return to his Colonial estates, became a man of great influence in the Colony. He was a member of the King's Council for 37 years, and finally its president. He lived in lordly state at his plantation, Westover, and gathered the most valuable library in the Colony, numbering about 4000 volumes. He was the founder of Richmond (1733); also one of the commissioners on the North Carolina boundary, and did much to encourage immigration. He was a patron of art and science, and a Fellow of the Royal Society of Great Britain. Byrd is best remembered as the author of the *Westover Manuscripts*, published in 1841 under three titles: *The History of the Dividing Line; A Journey to the Land of Eden;* and *A Progress to the Mines*, all remarkable for their style, wit, keen observation, and intrinsic interest. The best edition of these is that of J. S. Bassett (1901). Byrd's interesting letters have been published in *The Virginia Magazine of History and Biography* (1902).

BYRGIUS, bẽr'jĭ-ŭs, JUSTUS, or JOBST BÜRGI (1552-1632). A Swiss mathematician and inventor of various astronomical instruments. He was born at Lichtensteig, Canton of Saint Gall, and was employed as a mechanician first in the service of Wilhelm IV., Landgrave of Hesse, then of Emperor Rudolph II. Among his inventions may be noticed the proportional compasses. He also found a method of resolving spherical triangles, and is said to have hit upon the idea of logarithms.

BYRLAW, bẽr'lą (Icel. *byr*, AS. *by*, Engl. *by*, settlement + *log*, Engl. *law*). In early English and Scottish history, the local custom or law of a township, village, or rural district. This law appears to have been administered by popular local tribunals, having no connection with the regular courts of the kingdom, and to have been concerned, for the most part, with disputes as to boundaries, trespass of cattle, etc. It prevailed extensively in England, especially in Kent, as late as the Thirteenth Century, but has now almost everywhere yielded to the common law and the regular tribunals.

BYRNE, bẽrn, THOMAS SEBASTIAN (1842—). An American Roman Catholic divine, born at Hamilton, Ohio. He received his education at the public schools, the Preparatory Seminary of Saint Thomas, Bardstown, Ky., and Saint Mary's College of the West, where he graduated in 1864. After a supplementary course at the American College, Rome, he was ordained priest in Cincinnati (1869), and became instructor at Mount Saint Mary's Seminary. He was subsequently placed in charge of the Cincinnati Cathedral, and upon the reopening of Saint Mary's Seminary he became rector of that institution. In 1894 he was appointed Bishop of Nashville. In collaboration with the Rev. Dr. Pabisch, he translated Dr. Alzoy's *Church History* (3 vols., 1874-78). His other publications include *Man from a Catholic Point of View*, which was read at the Parliament of Religions (Chicago, 1893).

BYRNIE, bẽr'nĭ (AS. *byrne*, corselet, OHG. *brunna*, OIcel. *brynja*, breastplate; cf. OIr. *bruinne*, breast). A shirt of mail. In the time of the Carolingians it reached only to the hips, but in the Tenth Century it extended to the knees. The sleeves were made wide and short, affording no protection to the forearm. See COAT OF MAIL.

BYRON, ANNE ISABELLA MILBANKE (1792-1860). The wife of Lord Byron, and the only child of Sir Ralph Milbanke. She was born May 17, 1792; married Lord Byron January 2, 1815, and separated from him in February of the next year. On the death of Lord (properly Baron) Scarsdale, she became Baroness of Wentworth and for several years before her death employed her large income in works of charity. She died May 16, 1860. One child was borne by her to Byron, "Ada, sole daughter of my house and heart," who married William, Lord King, afterwards Earl of Lovelace. Consult Stowe, *Lady Byron Vindicated* (Boston, 1869).

BYRON, GEORGE GORDON, sixth Lord (1788-1824). One of the greatest of English poets. He was born in London, January 22, 1788, and was the only son of Capt. John Byron, of the Guards, and Catherine Gordon of Gight, a Scottish heiress. Captain Byron and his wife did not live happily. The husband was a profligate, and the wife's fortune was soon squandered at the gaming-table. Separated from her husband, Lady Byron retired on an income of £150 a year, to Aberdeen, with her lame boy, whom in her capriciousness she treated with alternate violence and affection. In his eleventh year Byron succeeded his grand-uncle, William, Lord Byron, and mother and son immediately left the north for Newstead Abbey, the ancient seat of the family, a few miles distant from Nottingham, in the romantic district of Sherwood Forest. On succeeding to the title, Byron was placed in a private school at Dulwich, and thereafter sent to Harrow (1801). The most remarkable thing about his early years was his extraordinary attachments. In his eighth year, in Aberdeenshire, he fell in love with Mary Duff. His cousin, Margaret Parker, who died early, was his next idol. His strongest passion, however, was for Mary Chaworth, whom he first met when on a visit to Newstead in 1803. Miss Chaworth's father had been killed in a duel by Lord Byron, the grand-uncle of the poet, and marriage would have healed the family feud and joined rich estates. But it was not to be. Miss Chaworth was Byron's senior by two years, and evidently felt little flattered by the worship of the lame Harrow boy. Next year came the parting interview described in *The Dream*. In 1805 Byron entered Trinity College, Cambridge. The next year he had a Newark bookseller print for him a volume of his verse, the entire impression of which he was induced to destroy. With additions and omissions, the volume was republished in 1807. Later in the same year Byron made his first real appearance before the public in *Hours of Idleness*. The poems contained in this volume were not absolutely without merit; but they might have been written by any well-educated boy who, in addition to ordinary cleverness, possessed the slightest touch of poetic sensibility. The volume was fiercely assailed by Brougham in the *Edinburgh Review*, and his sarcasms stung Byron into becoming a poet. Byron attributed the attack to Jeffrey. The satire *English Bards and Scotch Reviewers* was written in reply to the

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rticle in the *Edinburgh*, and the town was taken y a play of wit and a mastery of versification inequaled since the days of Pope. Byron now vithdrew from England, visiting Portugal, Spain, Turkey, and Greece. On his return he ublished the first two cantos of *Childe Harold* 1812), with immense success, and was at once nrolled among the great poets of his country. During the next two years he produced *The Giaour*, *The Bride of Abydos*, *The Corsair*, and *Lara*. While these brilliant pieces were flowing rom his pen, he was indulging in all the revelies and excesses of London society. What was oblest in the man revolted at this mode of life, nd in an effort to escape from it, he married, n 1815, Miss Milbanke, daughter of Sir Ralph Milbanke. This union was unfortunate. It asted only a year, and during the brief period oney embarrassments, recriminations, and all the iseries incidental to an ill-assorted marriage ere of frequent occurrence. After the birth of er child Ada Lady Byron retired to her father's ouse and refused to return. Byron became the heme of all uncharitable tongues. The most opular poet, he was for a space the most unopular individual in the country. In one of his etters, written from Italy some years later, reerring to the slanders current at the time, he aid: "I was accused of every monstrous vice f public rumor and private rancor. My name, hich has been a knightly or a noble one since y fathers helped to conquer the kingdom for William the Norman, was tainted. I felt that f what was whispered, and muttered, and murmured was true, I was unfit for England; if alse, England was unfit for me. I withdrew." he separation from his wife and the departure rom England in 1816, never to return, mark a tage in the development of Byron's genius. A ew element of power now entered into his verse. Misery and indignation stimulated him to remarkable activity. Six months' stay at Geneva roduced the third canto of *Childe Harold*, and *he Prisoner of Chillon*. *Manfred* and *The ament of Tasso* were written in 1817. The next ear he was at Venice, and finished *Childe Harold* here; and, in the gay and witty *Beppo*, made an xperiment in the new field which he was afterards to work so successfully. During the next ree years he produced the first five cantos of *on Juan*, and a number of dramas of various erit, *Cain* and *Werner* representing opposite oles. In 1821 he removed to Pisa, and worked here at *Don Juan*, which, with the exception of *he Vision of Judgment*, occupied his pen almost p to the close of his life. In 1822 Byron, Shelley, and Leigh Hunt started a journal called *The iberal*. After the tragic death of Shelley in the ummer of this year, Byron and Hunt quarreled, nd the journal came to a quick close. Morally, Byron's Italian life was licentious, and his enius was tainted by his indulgences. The least ensurable of all his moral lapses was his *liaison* ith the Countess Guiccioli. Near the close of is career he was visited by a new inspiration; e sun so long obscured shone out gloriously t its setting. In the summer of 1823 he sailed or Cephalonia to aid the Greeks in their struggle for independence. From Cephalonia he went Missolonghi at the beginning of January, 1824. here he found nothing but confusion and conending chiefs; but in three months he succeeded evoking some kind of order out of the chaos. His health, however, began to fail. He died from exposure and fever April 19, 1824. His body was conveyed to England, and buried in the family vault in the village church of Hucknall, near Newstead.

Lord Byron is a remarkable instance of the fluctuations of literary fashion. Elevated to the highest pinnacle of fame by his contemporaries, he was unduly decried after his death, when the romance which he had thrown around himself and his writings began to wear away; and it is only during the last twenty or thirty years that the proper place has been found for him in the public estimation. The resources of his intellect were amazing. He gained his first reputation as a depicter of the gloomy and stormful passions. After he wrote *Beppo*, he was surprised to find that he was a humorist; when he reached Greece, he discovered an ability for military organization. When all the schoolgirls of England fancied their idol with a scowling brow and a curled lip, he was laughing in Italy, and declaring himself to be the most unromantic being in the world. And he was right. Take away all his Oriental wrappings and you discover an honest Englishman, who, above all things, hates cant and humbug. In *Don Juan*, which is his masterpiece, and in his letters, there is a wonderful fund of wit, sarcasm, humor, and knowledge of man. Few men had a clearer eye for fact and reality. His eloquence, pathos, and despair, as in *Manfred* and *Childe Harold*, were only phases of his mind. Toward the close of his life, he was working toward his real strength, and that lay in wit and the direct representation of human life.

Murray, Byron's original publisher, has issued several editions of the complete works. Consult Henley, *Works of Lord Byron* (London, 1897-—). The latest edition is that by Coleridge and Prothero (London, 1898-1901). The best estimate of Byron is to be found in Matthew Arnold, *Essays in Criticism*, second series (London, 1888). The main source of information as to his life is Moore, *Letters and Journals of Byron, with Notices of His Life* (London, 1830, new ed. 1874). Consult, also: Macaulay, *Moore's Life of Lord Byron* (London, 1831); Elze, *Lord Byron* (Eng. trans., London, 1872); Jeaffreson, *The Real Lord Byron* (London, 1883); Nichol, "Life," in *English Men of Letters* series (London, 1880); Countess Guiccioli, *Lord Byron jugé par les témoins de sa vie* (Paris, 1868); English translation by Jerningham as *My Recollections of Lord Byron and Those of Eye-witnesses of His Life* (Philadelphia, 1869); Lady Blessington. *Conversations with Lord Byron* (London, 1834); Trelawny, *Recollections of Shelley and Byron* (Boston, 1858); Hunt, *Lord Byron and His Contemporaries* (London, 1828).

BYRON, Harriet. The author of most of the imaginary epistles which compose Richardson's *Sir Charles Grandison*. She is a youthful sentimentalist, and an orphan.

BYRON, Henry James (1834-84). An English playwright and actor, born in Manchester. He studied medicine and then law, but soon became an actor and a playwright, and will be remembered as the author of a number of successful plays, the earliest of which was *Fra Diavolo* (1858). *Our Boys* (1878) had a long run, but *Cyril's Success* is generally regarded as

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the best of his plays. Among his other works are: *Babes in the Wood*, *War to the Knife*, *A Hundred Thousand Pounds*, and *An American Lady*, all of which display ingenuity rather than invention. He published one novel, *Paid in Full* (1865); was the first editor of *Fun;* and established a short-lived paper called *Comic Times*.

BYRON, JOHN (1723-86). An English admiral and circumnavigator, the grandfather of Byron, the poet. He accompanied Anson around the world, suffering shipwreck and enduring great hardships in Patagonia, and as commander of a fleet he circumnavigated the globe in 1764-66. In 1769 he was Governor of Newfoundland, and in 1776 became vice-admiral. In 1778 he was sent with a fleet to watch the movements of Count d'Estaing, who had gone to the assistance of the United States in their war against England; and in July of the next year he fought the Count of Grenada, but the action was of little importance. In 1768 he published an account of his shipwreck on the coast of Patagonia. It furnished some hints to the author of *Don Juan*, who refers to "my grand-dad's narrative."

BYRON BAY. An open bay, about 50 miles wide, on the east coast of Labrador, North America, in latitude 55° N. and longitude 58° W. (Map: Canada, T 6).

BYRON ISLAND. See GILBERT ISLANDS.

BYSTRÖM, bü'strēm, JOHAN NIKLAS (1783-1848). A Swedish sculptor. He was born December 18, 1783, at Filipstad, in the Province of Wermland, Sweden, and educated under Sergell of Stockholm. In 1809 he obtained the highest prize in the Swedish Academy of Arts, and in the following year went to Rome, where he executed his first independent work, a "Drunken Bacchante," and sent it home. It was received with great approbation, and Byström had to repeat it thrice. In 1815 he returned to Stockholm, and surprised the newly elected Crown Prince (Bernadotte) by exhibiting a colossal statue of himself, which he had finished all but the head in Rome, and had found means to complete quietly in Stockholm. The Crown Prince was highly gratified, and commissioned Byström to execute colossal statues of Charles X., XI., and XII. After 1838 he resided in Stockholm; but returned to Rome in 1844, and died there March 13, 1848. His chief works are: "A Nymph Going into the Bath," a "Reclining Juno Suckling the Young Hercules," "Hygieia," "Pandora Combing Her Hair," "A Dancing Girl," a statue of Linnæus, and colossal statues of Charles XIII., Gustavus Adolphus, and Charles XIV. Byström excels in the delineation of females and children, but his male figures are not strongly characterized; his conceptions are always true to nature, his grouping skillful and pleasant, and his execution is clear and distinct.

BY'WATER, INGRAM (1840—). An English classical philologist, born in London, June 27, 1840. He received the degree of A.M. in Queen's College, Oxford, 1863, and was tutor, and, from 1883, university reader in Greek. In 1893 he succeeded Professor Jowett as regius professor of Greek. He is the editor of *Fragments of Heraclitus* (1877); *Priscianus Lydus* (1886); *Nicomachean Ethics* (1890); etc.

BYWAYS OF EUROPE. Descriptions of travel by Bayard Taylor (1869).

BYZANT, biz'ant. See BESANTS.

BYZAN'TINE ART. Broadly speaking, the art that flourished throughout the Byzantine Empire, from the time when Constantine the Great made Constantinople (Byzantium) its capital, A.D. 330, to the capture of the city by the Turks in 1453. The term may be applied to Christian art of the Oriental and Hellenic peoples, as soon as it began to differ from the style of early Christian art, which both East and West had largely in common at the beginning. Its historic development falls into six periods: (1) *Formative Age*, Fourth to the Fifth Century, in which experiments were tried and various forms of architecture and painting put to the service of religion, but no fixed formulas were found. Egypt, Syria, Asia Minor, North Africa, Greece, all erected monuments that differed very much from the official type of Roman Christian basilica; and it was the Hellenic painters who then depicted, both in manuscripts and on church walls, the first portraits of Christ and the earliest systematic series of Bible illustrations. (2) The *Golden Age* of Justinian, began about 500 A.D., and established the true norms of classic Byzantine art. These were, in architecture, the use of the dome on pendentives, with other forms of vaulting in subordination; the decoration of surfaces, mainly by deeply colored mosaics and rich marble facings, without the light and shade of heavy architectural projections or relief ornaments. The standard set by Saint Sophia was never afterwards equaled. The centre of official art was at Constantinople, and the clergy gradually assumed its control. This school declined during the Seventh Century. (3) The *Iconoclastic Age*, lasting substantially throughout the Eighth Century, while it seemed to give a death-blow to certain forms of religious art, really led to a healthy reform. It temporarily killed religious painting, from an exaggerated fear of the idolatrous tendency of painted images of sacred personages, but developed decorative and floral design, and its renovation of social and political life reacted healthily on art, preparing the way for (4) The *Macedonian Revival* of the Ninth and Tenth centuries. The sturdy rulers of the Macedonian dynasty counteracted the morbid and unhealthy tendencies of Byzantine art and fostered the return to classic models. The reigns of Basil the Macedonian, Constantine, and Nicephorus Phocas saw a second Golden Age of superb monuments. The imperial palaces were as magnificent as the palaces of the Cæsars in old Rome, and the industrial arts reached an unequaled perfection. (5) The *Age of the Comneni*, during the Eleventh and Twelfth centuries, at its beginning was as splendid as the preceding. A great new school of art was established at Mount Athos. This monastic school spread its influence far and wide. Many cities and monasteries became special art centres, no longer dependent on Constantinople. Thessalonica continued its traditions. The monastic churches of Chios, Daphne, Mount Helicon, Meteora, are a few of the monuments of this age. It was now that Europe, through the Crusades, through the trade with Venice, Pisa, Genoa, and other Ita-

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cities, and through the Greeks in Sicily and South Italy, came to feel most intensely the influence of Byzantine art, by which the barbarism of European nations was modified and their newly awakened artistic instincts directed. (6) The *Age of the Palæologi*, during the Thirteenth and Fifteenth centuries, is that of decadence. The decline was hastened by the barbarous conquest of Constantinople and the Empire by the Crusaders in 1204. The stream of fruitful art was dried up and the works of this age, which helped to influence Italy in the revival of painting, were unworthy of this high office, and have helped to give the mistaken idea of Byzantine painting generally current. The churches at Trebizond show the decline in architectural grandeur and decorative ability.

Byzantine art was a composite picture, for it had come into a varied inheritance. It derived intense love of color from the Orient, power to idealize from the Greeks, ability in architectural composition from the Romans. Its use as an impressive part of the pomp of imperial power in palace, processions, and ceremonials was thoroughly Oriental. Its exquisite treatment of every detail, where Roman art was so careless, was thoroughly Hellenic; its development of interior effects, its centralization and use for a systematic propaganda of ideas was thoroughly Roman. But in none of this was Byzantine art a plagiarist; it simply utilized these various elements in the service of a perfectly original scheme. Its most important additions to the general fund of the art assets of the world were: the *dome on pendentives*, which made it possible to suspend one or more domes over any kind of a ground-plan, thus securing superb interiors; *figured mosaic wall-paintings*, the most harmonious surface decoration for architecture, the most impressive expression of dogmatic religious art; *a system of Christian iconography*, corresponding to the system of classical mythology and embodying in art the same ideas that were expressed in creeds, dogmas, proceedings of the councils, and writings of the Fathers, and so serving as an important vehicle of religious instruction; the *preservation of classic traditions*, which would otherwise have been broken, and the imparting of them in modified form to the Mohammedans and Europeans of the Middle Ages; the *development of the minor arts* to a higher pitch of perfection than ever before, giving models to all branches of art elsewhere. It is well known how Byzantine ivories, miniatures, and enamels were the inspiration of mediæval sculptors and painters in Europe, their minute figures being enlarged in monumental copies.

When Byzantium was transformed into Constantinople by Constantine, the enlargement of the old city was made by the work of a large number of artists and artisans imported by Constantine from all parts of the Empire, but especially from Rome. A second pillaging of the artistic treasures of the ancient world took place for its benefit. Its forums, basilicas, baths, theatres, circus, were filled with works of Greek sculpture. While even then there was undoubtedly a considerable Hellenic element, the transformation of Christianity from a Roman to a Byzantine cult was gradual during the Fifth Century, and is symbolized by comparing the basilica of Saint John (c.450), still in the Latin style, slightly modified, with the 'little Saint Sophia,' or Church of Saints Sergius and Bacchus, in which, c.525, the elements of the Byzantine style were largely embodied. Probably these elements had been first worked out in more purely Hellenic soil and then brought into Constantinople; as, for instance, was the case with the scheme of Saint Sophia, brought in by architects from Asia Minor. The various stages in the school of Constantinople before and after the time of Justinian are illustrated by the many magnificent cisterns with their forests of columns (Fourth to the Tenth Century), the scanty remains of some of the old palaces (Boucoleon) and monasteries, the churches of Saint John (Fifth), Saints Sergius and Bacchus (Sixth), Saint Irene (Eighth), Theotokos (Tenth), Mone-tes-Khoras (Eleventh to the Thirteenth), Pantokrator (Twelfth). It is this central school which developed mosaic painting, a form of decoration that is seldom found in Asia Minor, Syria, Palestine, Egypt, or other parts of the Empire. It is difficult to follow the geographical intricacies of Byzantine art, for to the division into schools are added the territorial fluctuations. The official and central school at Constantinople was followed more or less strictly throughout the Greek provinces; almost as closely in parts of Asia Minor; still less closely in Syria. Certain large territories which were wrested from the Empire by the Arabs in the Seventh Century were at that time beginning to feel the strength of the influence of Constantinople, though they had not yet lost their artistic independence. Such were the provinces of Northern Africa and Egypt, of Mesopotamia, and part of Syria. The Coptic school in Egypt had some of its roots in ancient Egyptian art, but the churches of Old Cairo and the monasteries of the desert show that especially in decoration Byzantine art had obtained a strong foothold and that the Byzantine reminiscences found in the later Mohammedan art of Egypt are largely attributable to this source. Other regions of the East which remained unconquered by the Mohammedans mingled local traits with prevalent Byzantine characteristics. This was especially the case in Armenia, Georgia, and the neighboring regions of the Caucasus, where the central dome, or pendentive and high drum, and the Greek-cross plan govern nearly all churches from the Seventh to the Fifteenth Century, as at Dighour and Pitzounda, while their surface decoration is peculiar and akin to what we know as Celtic and northern ornament. Of all Eastern churches, those of Asia Minor—such as those of Cassaba, Myra, and Nicæa—are almost alone the exact echoes of the school of Constantinople, except for the productions of Greece itself and the present provinces of European Turkey. One of the most important functions of Byzantine art was its influence outside of its home sphere. It is quite certain that if when the northern tribes wiped out Roman culture in the West, Byzantine influence had not been actively exerted in Italy; if Ravenna and then Venice had not been preserved as Byzantine outposts and Rome resuscitated by Byzantine monks and immigrants; if Greek colonies had not been thrown into southern Italy, if Sicily under the Normans had not subjected herself to Byzantine influence, and if the great maritime republics that held the trade of the world in their hands from the Ninth to the Thirteenth Century—Amalfi, Venice, Pisa, Genoa—

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had not brought to the West all portable works of Byzantine art and themselves become impregnated with the artistic atmosphere of the East; and finally, if the Crusades had not opened up before the barbarous West superb vistas of the artistic civilizations of Byzantines and Mohammedans—if all this had not happened as it did, the torch of progress would not have been handed on and the great Gothic and Renaissance eras would not have been what they were.

ARCHITECTURE. Byzantine architecture is the complete monumental expression of Hellenic Christendom. The Greek Church in most higher branches of culture imposed itself upon the Latins, but it began by accepting the Latin scheme of basilical architecture. After experimenting with it for a while (Fourth to the Fifth Century), the Greek genius selected the Roman dome as its fundamental unit, in place of the wooden roof, and by the use of lofty piers and pendentive was able, in the Sixth Century, to suspend the dome and use it with any kind of ground-plan, even multiplying domes at will in the same interior. (See DOME.) It was in the abstract a higher form of architecture than either Roman or early Christian, and was the real link between Rome and the Middle Ages, because it showed how the vaulting systems of Rome could be adapted to the form of the Christian Church, and, taking up the dome at the point to which the Roman architects had developed it, carried it a step further and made possible all styles of architecture that have come, even after the Renaissance. The Romans had gone no further in weakening the solid circular wall that supported their domes than to cut niches in it; the early Christian architects had gone a step further and turned the lower part of this wall into a colonnade, which opened into one or more concentric aisles. But the Byzantine architects of Asia Minor invented the pendentive, which made it unnecessary that the supports should follow the outline of the dome. The preliminary stages are shown in buildings like San Vitale at Ravenna, the cathedrals of Ezra and Bosra in Syria, and Saints Sergius and Bacchus at Constantinople, all built early in the Sixth Century. Then came the masterpiece, Saint Sophia (q.v.) at Constantinople, built by Anthemius (q.v.) and Isidore, architects of Asia Minor, who here suspended the Pantheon dome in the air far more truly than Michelangelo did at Saint Peter's. Its two great semi-domes flanking the central dome made possible an oblong plan without breaking the unity. The apse, side aisles, and galleries are all more thoroughly subordinated to the central nave than in any other Christian structure. (For details, see under SAINT SOPHIA.) No other Byzantine church undertook to rival or imitate, even in plan, Saint Sophia. The great variety in plan and elevation of Byzantine churches is in strong contrast to the uniformity of early Christian churches. Some are in the form of a Greek cross, like Saint Mark's in Venice, with five domes; the commonest form is oblong, with each bay covered by a small dome. Usually there is a central dome, raised on a drum above the rest, and sometimes cross-vaults or tunnel-vaults take the place of minor domes. In course of time the churches became smaller, the domes were erected on higher drums, the closed porch or narthex became larger and was usually domed, the exteriors, instead of being of plain bricks, had alternate courses of brick and stone or marble, and were diversified by inset panels and patterns in relief, as well as by pilasters and arcades. Saint Irene represents the middle and the Theotokos and Pantokrator the final stage of this development at Constantinople. The churches of the Apostles, of Saint Elias, and of the Virgin at Salonica are among the most exquisite of this class in proportions and details, with tower-like domes and effective exteriors. In Greece proper the city churches, like the cathedrals at Athens and Mistra, are very small, and are excelled in size and decoration by the monastic churches, such as those of the Basilians at Chios, Mount Helicon (Saint Luke), Daphne, and Mount Athos, built between the Tenth and Fourteenth centuries. On a somewhat larger scale were the churches in the East. Syria, as shown by such churches as those of Damascus, Dana, Antioch, Edessa, held mainly to the basilical style up to the time of the Persian and Mohammedan invasions of the Sixth and Seventh centuries, which put an end to Christian architecture in that region. But Asia Minor, the source of Byzantine domical construction, still shows many churches of this style, such as those at Myra, Ancyra, Cassaba, Ephesus, Nicæa; Armenia, Georgia, and the Caucasus adopted for a period a pure Byzantine style, while at other times they developed local peculiarities, such as stone construction, pitched roofs, polygonal domes, carved ornamentation, etc. Churches at Ani, Digbur, Pitzunda, Etchmiadzin, etc., show how active this region was under its kings between the Tenth and the Fourteenth centuries. Near them was Trebizond, which shows churches belonging to the time in the Thirteenth Century when it was the Byzantine capital, while Constantinople was occupied by the Crusaders. Passing eastward, we find that the Byzantine style has penetrated into the northern provinces connected with the Empire of the East, into Servia and other Danubian provinces (as at Kurte d'Arjish, Studenitza, and Semendria), and into Russia (Saint Sophia at Kiev), where Slavic taste degraded it gradually until the bulbous domes and exaggerated and overloaded details placed Russian Byzantine architecture upon a level with Mongol and Indian monuments.

Byzantine architecture existed even beyond the political limits of the Empire. Parts of Italy were pervaded by it between the Sixth and Twelfth centuries. Ravenna is a well-known example of the earliest period, with its San Vitale, its mausoleum of Galla Placidia, and its baptisteries. Venice also was an outpost of the East. Saint Mark's was a reproduction of the Church of the Apostles at Constantinople, with its five domes on a Greek cross and with its superb series of mosaic and marble decorations. It is decoratively at least a better representative of Byzantine art than Saint Sophia. The earliest palaces of Venice also are thoroughly Byzantine not only in style, but in plan, as, for instance, the Fondaco dei Turchi and many of smaller size but better preservation. Santa Fosca at Torcello is also purely Byzantine. Farther south it is common to find Byzantine influence combined with Mohammedan. This is the case in Sicily —as in the Eremitani and San Cattaldo at Palermo—and in Campania. But throughout Calabria the churches are as purely Byzantine as in Greece, and other examples are scattered

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BYZANTINE ARCHITECTURE

INTERIOR OF THE CHURCH OF ST. SOPHIA, CONSTANTINOPLE

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UNIV. OF MICH.

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elsewhere, as the cathedral at Capri and San Germano at Monte Cassino. Even Germany (Aix-la-Chapelle, Paderborn) and France (whole of Périgord, especially Saint Front at Périgueux), were sporadically invaded. It was natural that the less civilized northern and eastern nations on the borders of the Byzantine dominion should receive its architecture. The monuments of the countries in the northern part of the Balkan Peninsula are of this class. Servia, Bosnia, Bulgaria, all borrowed from Byzantium, and it was the same even with the more powerful States.

The main classes of Byzantine architecture are: (1) Churches; (2) monastic establishments; (3) palaces; (4) fortresses. So little remains of minor classes, such as private houses, hospitals, fountains, civil edifices, etc., that we can get only vague ideas as to their style. The imperial palace at Constantinople exists no longer except in the descriptions of its gorgeousness. The fortresses have frequently survived and serve to show that in Africa, Syria, and Asia Minor they served as models to the Mohammedans, and subsequently to the Crusaders, thus revolutionizing the military architecture of Europe, as well as the East. The monastic establishments are even more important for achitectural history than the corresponding ones in the West (see MONASTERY), because Byzantium always remained subject to monastic art, whereas Europe was so only for a short time. There were of course certain great centres of monastic architecture, such as the Mount Athos monasteries, those of Thessaly (Meteora), the Stoudion near Constantinople, and Saint Simeon Stylites in Syria; but the monastic influence was not concentrated, as in the West, in a few large establishments, nor did the monks, as there, shun the cities. Every city was filled with them, and there were few churches that had no monastery attached to them. Among good examples are the monastery of the Eleventh Century on the island of Chios, that of Daphne, and Saint Luke on Mount Helicon in Greece, of the same period; but greatest of all is Mount Athos (q.v.). The Byzantine architects made but little use of concrete; building of brick, they were able to decrease the thickness of their walls. For their domes they used hollow conical bricks of very light clay, which fitted into each other. This gave a minimum of weight and a maximum of cohesion. Although they did not use any flying buttresses nor advertise their methods of construction as the Gothic architects did, they nevertheless invented a system of equilibrium through interacting thrusts and a concentration of thrusts upon given points, which, although not apparent, was none the less effective. At Saint Sophia there is a pyramidal progression, the thrust of the dome being received on two sides by semi-domes, on two others by immense buttresses, and then transmitted to the gallery vaults over side aisles and narthex, until it dies away in the low walls of the exterior. But the mathematical knowledge required to carry out the principle successfully on so large a scale was not to survive Anthemius very long. No subsequent attempts equal Saint Sophia. The nearest approach, the palace church of Basil the Macedonian, has been destroyed. In the decoration of their interiors Byzantine architects loved color as much as did the Romans, and they carried it out more thoroughly than the early Christian architects of the basilical style, for their system was an incrustation of marbles and mosaics far richer than that used in the West, whose architects were often satisfied with thin-colored wall paintings. The entire system of Christian iconography was often given in mosaic pictures, and the lower walls covered with patterns of *opus sectile*. The pavements also were of mosaics. This applies particularly to the central and most strongly Hellenic parts of the Byzantine dominions and less so to frontier provinces, such as Syria, Egypt, and Asia Minor. The classic orders were almost wholly discarded; capitals, friezes, cornices, and plaques were decorated in low relief, basket-work (undercut and openwork), and Oriental patterns, often borrowed from stuffs, and heavy projections were avoided. Sculptural became more and more subordinated to color effects.

SCULPTURE. There are few works of Byzantine figured sculpture, on account of both the Oriental incapacity in drawing the figure after the Roman decadence and the iconoclastic prejudice against images. There are a few early works, such as the Ambone at Salonica, some sarcophagi at Ravenna, the wooden doors of Santa Sabina in Rome, which show how closely akin its style was during the Fifth and Sixth centuries to early Christian sculpture, with added imagination and Hellenic refinements. One of the latest echoes of this stage is the colossal bronze statue of a Byzantine Emperor from Barletta, now in Naples, the last of the imperial statues. The stiffer late Byzantine methods which prevailed between the Tenth and Fifteenth centuries are shown in the Madonna of the cathedral at Ravenna, the reliefs of Christ and angels at the Eski-Diuma Mosque in Constantinople, and a few reliefs at the Mount Athos monasteries. While of rare occurrence, works of sculpture never lapsed into the state of barbarism current in Europe from the Seventh to the Twelfth Century, but always retained artistic qualities. Decorative sculpture especially was developed on principles of design more Oriental than classic; the stereotyped orders, anthemion, honeysuckle, egg-and-dart, and pearl motives, being superseded by a great variety of floral, geometric, and animal forms, sometimes free, sometimes schematic in arrangement. The technique also differed from that of classic ornament; the relief was usually slight, the surfaces rather flat, and the effectiveness secured by undercutting or sharp arrises, with violent rather than delicate transition of surfaces. This was carried to an extreme in the 'basket' capitals and similar works, where the design is almost entirely cut away from the ground, and in the altar and choir screens, where the main outlines are cut through the slab. The churches of Ravenna, Parenzo, Venice, Constantinople, and Salonica are rich in such works of the central Byzantine School, while a corresponding but independent development appears in the numerous churches of central Syria, where the design is freer and less like an adaptation of patterns from stuffs applied to sculpture. Byzantine ornament prevailed throughout Italy (except Lombardy) until the Eleventh Century, and lay at the basis of much of Mohammedan design in Egypt, Spain, and the East. It thus, more or less directly, permeated the Middle Ages. The minor branches of sculpture are described under MINOR ARTS.

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PAINTING. The methods of fresco or wall painting, of mosaic, and of panel painting were all practiced by the Byzantine School. The less durable wall paintings and panels of the early period have disappeared throughout the East, and it is only from the mosaics that any idea of the history of Byzantine painting before the Twelfth Century can be gained. Its influence was even more universal than that of Byzantine architecture or sculpture, and dominated practically all schools of Christian art until the Renaissance. It was felt even in the later frescoes of the Roman catacombs. The wholesale destruction of examples in the East itself, first by the persecution of the Iconoclasts (q.v.), then by the vandalism of the Mohammedans, has obliged historians to rely largely on examples preserved in the West. The earliest stage appears at Ravenna in the mosaics of the two baptisteries and especially in the mausoleum of Galla Placidia, an exquisite scheme of color and decoration typifying the classic stage of the Fifth Century. The second period (of Justinian) is shown in mosaics at Saint Sophia in Constantinople and at Salonica, and especially in those of San Vitale and Sant' Apollinare Nuovo at Ravenna, in which the mosaics form substantially the entire scheme of internal decoration both figured and ornamental, with scenes from both the Old and New Testaments. Ordinarily, it was only in the apse, the dome, and the triumphal arch that so expensive a form of ornament was employed. There was a period of decadence during the Seventh and Eighth centuries, of which some examples remain in Ravenna (Sant' Apollinare in Classe) and Rome (Sant' Agnese and San Venanzio), though hardly anything remains of this time outside of Italy. During the revival under the Macedonian dynasty (Ninth to the Eleventh Century), the cycle of subjects represented by Byzantine painting was enlarged and systematized into a complete iconographic cycle, which furnished themes and their method of treatment to later art in the West. The most superb single group of monuments in which the mosaicists showed their skill was the imperial palace and chapel at Constantinople. To the close of this period belong the mosaics of Nicæa, of Saint Luke on Mount Helicon, of Chios (monastery of Basilians), of Daphne, and of Saint Sophia at Kiev in Russia; while its earlier years may well be represented by the great series in Santa Prassede at Rome, in Saint Irene at Constantinople, and Saint George at Salonica. With the middle of the Eleventh Century a new stage of activity opens for Byzantine painting. In reality its decadence has commenced, but the revival of art in Europe at that very time gives it a far broader scope beyond the now much-narrowed limits of the Eastern Empire. The Italian States, such as Venice (mosaics of Torcello, Saint Mark's, and Murano) and the Norman kingdom in the south (Cefalù, Martorana, and Capella Palatina at Palermo), employed Byzantine mosaicists, who trained local imitators. The Roman School was newly founded in this manner (Grottaferrata, Santa Maria in Trastevere); so was the great Benedictine School of Monte Cassino under Desiderius. These three centuries (Eleventh to the Thirteenth) furnish for the first time numerous extant frescoes, from the scattered examples in the Greek monastic chapels of Calabria to the large coördinated series in the monastic churches of Mount Athos and Campania (Sant' Angelo in Formis, Sessa, and San Niccolò near Monte Cassino). Besides these and other centres of Byzantine influence in Italy, the Russian, Bulgarian, Armenian, Georgian, and other schools of painting are founded on Byzantine models. The rules for painting, both as to technical method and treatment and arrangement of subjects, are embodied in manuals, such as that attributed to Panselinos and used for centuries by the painters of Macedonia and Mount Athos (Didron and Durand, *Manuel d'Iconographie Chrétienne*, translated from the Greek, Paris, 1845). These carefully detailed directions, written and arranged in the form of a book, were circulated everywhere, and while facilitating quick execution, called for little exertion of artistic imagination or taste, and hastened the decadence of true art in the Byzantine school. When Italian fresco painting, as well as mosaic painting, was revived in the Thirteenth Century from one end to the other of the peninsula, the native artists went to the Byzantines to be taught. Such leaders as Giunta at Pisa, Margaritone at Arezzo, Guido and Duccio at Siena, Cimabue at Florence, Cavallini at Rome, adopted Byzantine methods wholly or in part. The Fourteenth Century witnessed the complete emancipation of the West, as well as the complete decadence of painting in the East. Such mosaics as those of Bethlehem (Church of the Nativity) and of the Kachriye Djami at Constantinople show the approaches of this decadence, which becomes plain in the mass of frescoes at Mount Athos and Meteora in Thessaly, at Mistra and Trebizond. Since then there has been nothing but lifeless repetition in the monuments of the Greek and Russian churches.

MINOR ARTS. The mediæval artists of the Byzantine Empire excelled in the arts of luxury, decoration, and industry; in the illuminating of manuscripts; the carving of ivory book-covers, boxes, and diptychs; the weaving of tapestries, hangings, and rugs; the making of superb vestments for the priesthood and nobility; the carving of cameos and precious stones, glassware, and faïence; the casting, embossing, chasing, and enameling of works in gold, silver, and bronze. Church treasuries and palaces were equally filled with a multitude of such works. The description of the ceremonial of the imperial palace by the Emperor Constantine Porphyrogenetus, the texts relating to Saint Sophia, the report of the embassy of the Lombard Liutprand, and many other texts are confirmed by the surviving examples exported to the West. The superb collection of church vessels in the treasury of Saint Mark's in Venice is mainly part of the loot of 1204 from Saint Sophia. The imperial dalmatica at Saint Peter's in Rome is the most beautiful of Byzantine figured stuffs, which were among the most valuable exports from the East. The enameled reliquary at Limburg (948-59) and the crown of Saint Stephen (1071-78) at Budapest also stand at the head of their class, being surpassed only by the famous Pala d'Oro at Saint Mark's. That the artists of Constantinople often received orders from the West is shown by the bronze doors decorated with designs in *niello* executed for Italian churches in the Eleventh Century, such as those of Amalfi, Monte Cassino, Sant' Angelo, Atrani, and Saint Paul's at Rome. The ivory carvings

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still extant are very numerous. The golden ages for their production were the Fifth to the Sixth and the Tenth to the Eleventh centuries, though perfection in this branch of art was more constant than in any other until the Thirteenth Century. Among the most beautiful early pieces are the Monza diptych of Galla Placidia (c.440), the Archangel of the British Museum, the Brescia box, and especially the marvelous episcopal ivory throne at Ravenna. Of later works, some of the finest are the "Virgin and Child," the "Crucifixion" triptych and the "Coronation of Romanus and Eudoxia" in Paris. One especially interesting class is that of the ivory oblong boxes, the only large series that are not religious in character, carved with lifelike scenes of daily life or borrowed from classic legend and myth—a peculiar survival. These can be seen at Sens, Cortona, Florence (Carrand), Saint Petersburg, New York (Metropolitan Museum), London (Saint Kens), and in nearly all large collections of mediæval ivories. Surpassing even the ivories, both in their importance for the history of art and in remaining examples, are the Greek illuminated manuscripts. It was in the East that the first works of this sort were executed. The idea of making pictures of all the main events of the Old and New Testaments in chronological series, starting in this way, passed into the field of monumental painting in the Fifth Century, and was most fruitful in results. The gold ground, the brilliant coloring, the idealistic qualities, and the opposition to realism of this branch of art made it peculiarly suitable as an expression of the Byzantine spirit. It followed the same historic vicissitudes as ivory-carving. The Rossano Gospels, the Vienna and London Genesis, the Vatican roll of Joshua and Topography of Cosmas, the Syriac manuscript at Florence are the leading early works (Fifth to the Sixth Century). For the middle period, with its peculiar combination of asceticism and classic revival, the typical works are the Homilies of Gregory Nazianzen and the Psalter in Paris (Bibliothèque Nationale), and the later Menologium of Basil at the Vatican (Ninth to the Tenth Century). A certain number of manuscripts executed by imperial command are especially magnificent, such as Saint John Chrysostom for Nicephorus Botaniates (1078-81) at Paris, the Panoply for Alexis Comnenus (1081-1118), and the Evangeliarium for John Comnenus (1118-43) at the Vatican. The decoration has become extremely rich at this time and the figures reduced in size or surrounded by heavy borders. Classic traditions no longer obtain, and asceticism dominates. The connection with monumental painting during all these centuries has remained very close, and as there is an unbroken series of examples, in contrast to the scarcity and breaks in larger works of mosaic and wall painting, the miniatures supply invaluable material for the history of mediæval painting. In this branch only does the East preserve many examples, in the libraries of many monasteries, such as those of Mount Sinai, Mount Athos, and many more throughout the Levant. Still it is in Western collections, such as the Vatican, Bibliothèque Nationale, and British Museum libraries, that the bulk has found refuge. Being a common object of commerce, these manuscripts, imported to Italy, Germany, and France, furnished local sculptors, painters, and decorators with models and motives in nearly every branch of art during all the centuries before the Renaissance. Finally, there are a few other categories which may be mentioned, though of lesser importance. There were little portable mosaic tablets, such as the diptychs in the Opera del Duomo in Florence and the Transfiguration in the Louvre, of marvelous delicacy of execution. The panel pictures, which were of considerable size in Italy, appear to have been smaller in the Byzantine School. The remaining examples are mostly later than the Twelfth Century. There are interesting collections at the Vatican, at Ravenna, and at Palermo. Earlier panel pictures are some of the so-called miraculous paintings of the "Virgin and Child," some supposed to be painted without hands. A number are in Rome (e.g. Santi Domencio e Sisto and Santa Maria Maggiore), Venice (Saint Mark's), Bologna (San Stefano), and throughout Italy. Crete was the centre for a school of panel painting, one of its leaders being Rico. It influenced the Italian schools in the Thirteenth Century. In Venice itself was established, in the Eleventh Century, a school of Byzantine painters. In the vexed question of Byzantine influence over European art, there is one point where no reasonable doubt can exist: that in all these minor arts the far more advanced culture of the East furnished the standards, not only for technique and artistic form, but for treatment of theme. The silk and tapestry workers of Sicily, Venice, Rome, and Flanders, the gold, silver, and enamel workers of the Rhine, the mosaicists of Campania and Venice, the panel painters of Tuscany, the ivory-carvers and goldsmiths of the monasteries everywhere, learned their art from Byzantium.

BIBLIOGRAPHY. Bayet, *L'Art Byzantin* (Paris, 1892), is a convenient handbook. The literary sources are collected in Unger, *Quellen der byzantinischen Kunstgeschichte* (Vienna, 1878). In Garrucci, *Storia dell' arte Cristiana* (Prato, 1879-99), are reproduced the miniatures, ivories, mosaics, and other works earlier than the Ninth Century. Kondakoff, *Histoire de l'art Byzantin* (Paris, 1886-91), is a careful study of the history of Byzantine illuminated manuscripts. Labarte, *Histoire des arts industriels* (Paris, 1873), though uncritical, is very important as the only general treatment of all the minor arts, well illustrated. The great collections of Cahier and Martin, *Mélanges d'archéologie* (Paris, 1847-56), and ib., *Nouveaux mélanges d'archéologie* (Paris, 1874), contain many ivories, stuffs, and illuminations. For enamels the best work is Kondakoff, *Geschichte und Denkmäler des byzantinischen Emails* (Frankfort, 1889-92). For an account of the great share taken by the monasteries of Mount Athos, consult Brockhaus, *Die Kunst in den Athos-Klöstern* (Leipzig, 1891); for methods of construction, Choisy, *L'art de bâtir chez les Byzantins* (Paris, 1883); for groups of monuments, Pulgher, *Les anciennes églises Byzantines de Constantinople* (Vienna, 1878); Salzenberg, *Die altchristlichen Baudenkmale von Konstantinopel* (Berlin, 1854); Texier and Pullan, *Byzantine Architecture* (London, 1884). Historical synopses may be found in Essenwein, *Byzantinische Baukunst* (Darmstadt, 1886), in German series of handbooks edited by Durm, and in Kraus, *Geschichte der christlichen Kunst*, I. (Freiburg, 1896).

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BYZANTINE EMPIRE, also styled the East Roman, Eastern, Greek, or Later Roman Empire; but a better name is 'the Empire of New Rome.' On the death of Theodosius (q.v.), in 395, the Roman Empire was divided between his two sons, Arcadius, who had the eastern half, with his capital at Constantinople, and Honorius, who had the western half. This event is generally taken for the beginning of the so-called Byzantine Empire, which took its name from Byzantium (q.v.), the ancient name for its capital. It came to an end in 1453, when Constantinople was captured by the Turks.

Arcadius (395-408) was weak and wholly under the domination of his successive ministers, Rufinus, Eutropius, and Gainas, of whom the first and the last were Germans; Gainas, who had murdered Rufinus, was succeeded in power by the Empress Eudoxia. Only after her death, in 404, was Arcadius at all independent. He was succeeded by his son Theodosius II., a boy of 7, who ruled from 408 to 450. During his whole reign the government was ably carried on by his sister Pulcheria, who was noted for her rigid virtue. During his reign the Huns under Attila exacted repeated contributions of money and gifts. Attila's demands ceased as soon as they met with a firm refusal from Marcianus (450-457), whom Pulcheria married after the death of Theodosius. Leo the Thracian (457-474) was elevated to the throne by the German general Aspar, who was all-powerful until he was murdered by the Emperor in 471. Zeno (474-491), son-in-law of Leo, succeeded, although the latter's son Leo II., a boy of 4, was at first proclaimed Emperor. After the death of Zeno his widow married Anastasius I. (491-518), who obtained the Empire through her favor. Justin (518-527) was an Illyrian peasant, of Slav descent; as a soldier of fortune he had risen rapidly. He put an end to the religious troubles which had existed under his predecessors. Leo, Zeno, Anastasius, and Justin were all men of experience, who pursued a cautious policy, recruited an army of natives, and made administrative and financial reforms, and left the treasury full, the army strong, and the Empire intact. But for their labors, the reign of Justinian the Great (527-565) would have been impossible. By his conquests and able administration he raised the Empire to a higher degree of prosperity and power than it was ever again to experience. His entire policy was directed toward unity, and this formed the keynote for the future history of the Byzantine Empire. He sought to bring all under one State, one Church, and one law. The Roman law was compiled and published under his auspices in the form of a monumental code. After his death the Empire declined rapidly. His great enterprises had exhausted the treasury and necessitated heavy taxation. His successor, Justin II. (565-578), without his ability, aspired to greater glory. The Persian War, which he provoked needlessly, drained the resources of the Empire, taxation became a crushing burden, the Avars and Slavs devastated the northern border, the Lombards overran most of Italy. Inefficient or unfortunate rulers succeeded, Tiberius Constantius (578-582), Maurice (582-602), and Phocas (602-610)—until, after the death of the last, Heraclius became Emperor (610-641). He humbled Persia, which had been the great opponent of Byzantium, and by 628 he had restored the Empire to its old supremacy in the East and was hailed as 'the new Scipio.' But the provinces of the Empire were exhausted by the long wars and had suffered from the hostile occupation. Consequently, when the Arabs began their great missionary conquests the emperors were too weak to oppose them successfully and were forced to see one after another of their provinces wrested from their grasp. The house of Heraclius furnished two other able emperors—Constans II. (641-668) and his son Constantine (668-685), who fought bravely against the Mussulmans and checked their advance. But the reign of Justinian II. (685-695 and 705-711) was disastrous, and after his death anarchy brought the Empire to the verge of ruin. The rebel, Leo the Isaurian (717-741), saved the State. He defended Constantinople during the long siege by the Saracens, and reorganized the Empire, which, in spite of the efforts and ability of Heraclius and his grandson and great-grandson, had been steadily decaying. Leo's descendants are remembered chiefly for their efforts to restrict the worship of images. (See ICONOCLASM.) But this is not just, as the Empire gained in strength and prosperity under the Isaurian dynasty. Constantine Copronymus (741-775) was a great warrior and extended the boundaries of the Empire both in Asia and Europe. He reformed the administration, planted colonies along the frontiers, and encouraged commerce. His son, Leo IV. (775-780), was able, but he was succeeded by his son, Constantine (780-797), a boy of 9. The latter was under the guardianship of his mother, Irene, until he was 21. Then the two reigned conjointly until 797, when Irene had her son blinded and deposed. Her five years of rule (797-802) were very disastrous to the Empire. Nicephorus I. (802-811) was compelled to pay tribute to the Caliph Harun-al-Rashid in order to make peace with him, and was slain by the Bulgarians. After two years of disaster, Leo the Armenian (813-820) defeated the Bulgarians and began a prosperous reign, only to be murdered by conspirators. Under Michael the Amorian (820-829) the Saracens conquered Crete and began the subjugation of Sicily. His son, Theophilus (829-842), was engaged in almost constant warfare, bloody but indecisive, with the Caliphs. His reign, however, was prosperous at home, and he was renowned for his justice and the great buildings which he constructed. The Empire in his time was wealthy, and Constantinople was the centre of European trade. His son, Michael III. (842-867), was only 4 years old when he became Emperor. He grew up a drunkard, and no one attempted to revenge his death when Basil the Macedonian (867-886), whom he had made co-Emperor, caused him to be murdered.

Under the emperors of the Macedonian line the government was strengthened by the regular transmission of the imperial power. In fact, the whole period from 717 to 1057 was a time when the Empire was on the whole prosperous, well administered, and triumphant. Basil was successful in all his wars, except in Sicily, where Syracuse was captured by the Saracens in 878. He had great ability; his code of laws remained in use for centuries. His son, Leo the Wise (886-912), and his grandson, Constantine Porphyrogenitus (912-959), were literary men of no mean ability. Fortunately, the Empire was pros-

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perous and its enemies were weak. Romanus II. (959-963), son of Constantine, reconquered Crete through his able general, Nicephorus Phocas. The latter became Emperor (963-969) by marrying Romanus's sister, but he ruled the Empire in the name of his two step-sons, Basil II. (963-1025) and Constantine VIII. (963-1028), and the same was done by John Zimisces (969-978), who murdered Nicephorus and married his widow. Like Nicephorus, John Zimisces was an able soldier. He defeated the Russians and reconquered Antioch and Edessa from the Saracens. Basil II. succeeded to the Empire, crushed the Bulgarians, and extended his dominions farther than any Emperor since Justinian. Constantine VIII. was sole Emperor from 1025 to 1028. He had taken little part in the government before and was very weak. On his death without a son the husbands and creatures of his daughter Zoë ruled the Empire for twenty-six years. It was on the whole a very disastrous period. But Theodora, Zoe's sister, who ruled from 1054 to 1057, was able and virtuous. With her the Macedonian line ended.

For twenty-six years there was a succession of emperors of little importance, none of them able to cope with the Seljukian Turks, who rapidly conquered all of the Asiatic possessions of the Empire. Alexis Comnenus (1081-1118) was compelled to face new dangers from the attacks of the Normans and the armies of the Crusaders. He struggled bravely and was successful in many respects. But, unfortunately, the finances of the Empire were seriously impaired by the diversion of commerce from Constantinople occasioned by the growth of the Italian cities and the foundation of the Kingdom of Jerusalem. In addition, the policy of Alexis caused the Greeks to be bitterly hated by the Crusaders. Alexis was succeeded by John the Good (1118-43), who was vigorous and warlike. He was constantly engaged in fighting the Seljuks, Hungarians, Servians, and Armenians. Manuel Comnenus (1143-80) engaged in many wars for his own personal glory, but neglected the finances and government, so that he left the Empire in a bad condition. In the next twenty-four years incompetent rulers brought the Empire to the verge of ruin. Cyprus was lost, Bulgaria became independent, and the Seljuks threatened to conquer Constantinople. The Venetians were hostile, and allied themselves for an expedition with the Crusaders, who coveted the riches of Constantinople, which seemed to them fabulous. In 1204 Constantinople was taken and sacked and the Latin Empire established. This was very weak and lasted only until 1261, when Michael Palæologus, the ruler of Nicæa, the strongest of the Greek States which had arisen when the capital was captured by the Franks, expelled the Latins and reëstablished a Byzantine Empire. But this empire was much smaller than it had been in 1204, and the ruling family, the Palæologi, were unable to make it powerful. Michael VIII. (1261-82) attempted to gain allies by offering to bring the Greek Church under the authority of the Pope. His son, Andronicus II. (1282-1328), was utterly incompetent, and the last years of his reign were filled with civil wars. A period of disaster followed. The command of the sea was lost, the finances were in hopeless disorder, and the rulers were weak. The Ottoman Turks were now establishing their power on the ruins of the Seljukian realm in Asia Minor, and one by one they conquered the provinces of the Empire. Under John V. (1341-91) the Turks made their first permanent conquest in Europe by seizing Gallipoli in 1354. Manuel II. (1391-1425) and John VI. (1425-48) were feeble rulers and practically vassals of the Sultan. Constantine XIII. (1448-53) struggled bravely but unsuccessfully to retain his capital, the only portion of the Empire which was left, and finally, in 1453, Constantinople was taken by the Turks. The capture of the capital marks the end of the Byzantine Empire.

Until recently it has been the fashion to treat the Byzantine Empire with contempt. Gibbon described its history as " a tedious and uniform tale of weakness and misery." Voltaire spoke of it as "a worthless repertory of declamation and miracles, disgraceful to the human mind." Montesquieu wrote: "The history of the Greek Empire, from Phocas on, is merely a succession of revolts, schisms, and treacheries." Taine condemned it as "a gigantic moldiness lasting a thousand years." In 1854 a writer in an English review "rejoiced over the supposed moment when the last Byzantine historian was blown into the air by our brave allies the Turks." But in the last half-century all this has been changed. Scholars now recognize the inestimable debt which we owe to the Byzantine Empire. They realize that for eight centuries the Roman Empire, transplanted to New Rome, i.e. Constantinople, persisted in its task; that law, literature, industry, and commerce did not cease to flourish; that Constantinople stemmed the tide of invasion from the East, which otherwise might have engulfed all Europe. They have learned that the most striking feature of Byzantine history is "its constant vitality and power of revival," its "marvelous recuperative energy," shown at every crisis in its history.

It is impossible to characterize this history as a whole, because it covers a period of time greater in length than the history of England from the Norman Conquest to the present day. For more than a thousand years dynasties changed, wars and revolutions took place, the fortunes of the Empire sank and rose again. Of the 107 persons who ruled from 395 to 1453 as emperors or associates of emperors, 20 were assassinated, 18 were blinded or otherwise mutilated, 12 died in a monastery or a prison, 12 abdicated under compulsion or of their own free will, 3 died of starvation, 8 died in battle or as a result of accident—a total of 73. Vice, corruption, and cruelty were the dominant features at some periods; the government was despotic; the people were superstitious, effeminate, and servile. Yet the Empire lived on; the administration and organization remained effective; the traditions and civilization of old Rome were maintained. Great wealth, which was a source of wonder to all visitors, was accumulated, and great armies, which were the most effective in the world, were maintained. If any scholar, in spite of the complexity of Byzantine history, should attempt a generalization, probably he would say, as Frederic Harrison has said—"first, that the Byzantine Empire preserved more of the tradition, civil and military organization, wealth, art, and literature of the older Rome than existed elsewhere; and, secondly, that in many essentials of civilization it was more modern than the nascent nations of the West." These are the

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two facts which are most striking, its antiquity and modernity, and just here is one of the reasons why Byzantine history is not attractive to us; its antiquity seems only an aping of the past; its modernity fails to interest us because we have reached a higher development than the Byzantine Empire ever did.

New Rome, like old Rome, had a wonderful capacity for absorbing and assimilating less civilized peoples. The Empire included representatives of all the races of eastern Europe. It opened to all full participation in its life. Its emperors might be of any nationality. Any barbarian of ability, if baptized, was welcome to its army, administration, and Court. This was one of the causes of its strength. A second was the position of Constantinople. The city could not be reduced by starvation. Its walls, until 1204, proved strong enough to defy all invaders. Then, too, while the Western Empire was being overrun by the barbarians, the Asiatic provinces of New Rome enjoyed an almost continuous peace. From their wealth the Empire secured the resources necessary to hold its European possessions, and to carry on the wars of Justinian. Finally, it was fortunate in having a large number of able emperors. Most of them were not brilliant personalities who command admiration, but rather cautious administrators, indefatigable workers, who labored slowly and steadily to strengthen the Empire, to fill the treasury, and to improve the administrative service.

The Empire, although conservative, was not wholly unprogressive. This is exemplified in its military organization, its law, its art, and its manufactures. Thus, after the battle of Adrianople (q.v.), the Byzantines realized the fact that the old infantry army was no longer efficient, and formed a new army mainly of cavalry. The infantry they supplied with bows and lances in place of swords and javelins. They developed armor for protection. They used a smaller and more effective tactical unit than the old legion, and they recruited an army of subjects, not mercenaries. They developed the art of fortification and the use of Greek fire. They built a great navy. Oman says: "The art of war as it was understood at Constantinople in the Tenth Century was the only system of real merit existing in the world; no Western nation could have afforded such a training to its officers till the Sixteenth, or we may even say the Seventeenth Century." The *Corpus* of Justinian continued for centuries to be the law of the Byzantine Empire. But it was constantly modified and expanded to suit new conditions. In the Ninth Century a new code was drawn up (see BASILICA) in which the influences of Christianity and advancing civilization are marked. In the Eighth Century a maritime code, a military code, and a rural code were developed to meet the changed conditions. The first, especially, is of great importance in the history of legal ideas. Byzantine art (q.v.) is treated at length elsewhere. Here it deserves mention as an indication of the great influence which the Byzantine Empire exercised on Russia, on the Mohammedan caliphates in the East and West, on the south of Italy, on Venice, and on some parts of France and Germany. To-day examples of Byzantine architecture are to be found in every Christian and Mohammedan country. In the manufacture of mosaics, silks, and embroidered satins, the Byzantine Empire was preëminent for centuries. The samite and sendal of the mediæval romances came from Constantinople.

The direct services of the Byzantine Empire to Europe were many and varied. Four, in particular, deserve emphasis. (1) It was the bulwark of Europe from which host after host of invaders were beaten back. For seven centuries, almost unaided, it bore the brunt of every attack, and thus enabled the Western nations to develop and gain strength. (2) It preserved the Greek and Roman culture and transmitted it to western Europe as the people of the younger nations became sufficiently advanced to share in the priceless heritage. Some of this culture was constantly filtering through, but during the period of the Crusades and later the transmission was most marked. (3) It maintained the world's commerce, which for centuries was centred at Constantinople. The pupils whom Constantinople had formed, Venice and Amalfi, wrested the sceptre of the seas from her only in the Eleventh Century. (4) It was the civilizer of all eastern Europe, where the influence of the Greek Church, Greek art and architecture, and Greek administration is everywhere evident at the present day.

BIBLIOGRAPHY. The original authorities for the history of the Byzantine Empire are the authors whose works are included in the collection of the Byzantine Historians. The first edition was published in Paris, in thirty-six volumes, between 1648 and 1711. This collection was reprinted with additions in Venice, 1727-38. In the Nineteenth Century, Niebuhr, assisted by Bekker, the Dindorfs, and others, edited the so-called 'Bonn Edition' under the name of the *Corpus Scriptorum Historiæ Byzantinæ*. But this last edition is extremely unscholarly. There are separate editions of the most prominent chroniclers, which will be found under their respective names. Of the secondary works, the following may be mentioned: Finlay, *History of Greece from B.C. 146 to A.D. 1864*, edited by Tozer (7 vols., Oxford, 1877); Gibbon, *Decline and Fall of the Roman Empire*, edited by Bury (7 vols., London, 1896-1901); Krumbacher, *Geschichte der byzantinischen Litteratur* (Munich, 1897); Bury, *The Later Roman Empire* (New York, 1889); Heyd, *Histoire du commerce du Levant au Moyen Age* (Leipzig and Dessau, 1885); Krause, *Die Byzantiner des Mittelalters in ihrem Staats-, Hof- und Privatleben* (Halle, 1869); Rambaud, *L'empire grec au Xme siècle* (Paris, 1870); Pears, *Fall of Constantinople* (New York, 1885); Oman, *Byzantine Empire* (London, 1892); Harrison, *Byzantine History in the Early Middle Ages* (London, 1900). The last gives an excellent select bibliography of the monographs on special phases of Byzantine history. Very useful bibliographical clues can also be found in the appendices and notes to Bury's edition of Gibbon.

LIST OF EMPERORS OF THE BYZANTINE EMPIRE

Arcadius, 395–408.
Theodosius II., 408–450.
Marcian, 450–457.
Leo I., the Thracian, 457–474.
Zeno the Isaurian, 474–491.
Anastasius I., 491–518.
Justin I., 518–527.
Justinian I., 527–565.
Justin II., 565–578.
Tiberius Constantinus, 578–582.
Maurice, 582–602.
Phocas, 602–610.

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HERACLIAN DYNASTY, 610–717

Heraclius I., 610–641.
Heraclius Constantinus, 641.
Heracleonas, 641.
Constantinus (Constans II.), 641–668.
Constantine IV. or V., *Pogonatus*, 668–685.
Justinian II., 685–695.
Leontius, 695–697.
Tiberius Apsimarus, 697–705.
Justinian II. (restored), 705–711.
Philippicus Bardanes, 711–713.
Artemius Anastasius, 713–716.
Theodosius III., 716–717.

SYRIAN (ISAURIAN) DYNASTY, 717–820

Leo III., the Isaurian, 717–741.
Constantine V., or VI., *Copronymus*, 741–775.
Leo IV., the Chaza, 775–780.
Constantine VI. or VII., 780–797.
Irene, 797–802.
Nicephorus I., 802–811.
Stauracius, 811.
Michael I., *Rhangabe*, 811–813.
Leo V., the Armenian, 813–820.

AMORIAN DYNASTY, 820–867

Michael II., the Stammerer, 820–829.
Theophilus, 829–842.
Michael III., the Drunkard, 842–867.

BASILIAN OR ARMENIAN (MACEDONIAN) DYNASTY, 867–1057

Basil I., the Macedonian, 867–886.
Leo VI., the Wise, 886–912.
Constantine VII., or VIII., *Porphyrogenitus*, 912–959.
Alexander, associate Emperor, 912–913.
Romanus I., *Lecapenus*, 919–944. (Associate Emperor together with his three sons, Christopher, Stephen and Constantine.)
Romanus II., 959–963.
Basil II., *Bulgaroctonus*, 963–1025.
Nicephorus II. Phocas, 963–969, associated with Basil II.
John I., Zimisces, 969–976, associated with Basil II.
Constantine VIII. or IX., 1025–1028.
Romanus III., *Argyrus*, 1028–1034.
Michael IV., the Paphlagonian, 1034–1041.
Michael V., 1041–1042.
Constantine IX. or X., *Monomachus*, 1042–1055. (Reigns with his wife Zoë.)
Theodora, 1055–1056.
Michael VI., *Stratioticus*, 1056–1057.
Isaac I., Comnenus, 1057–1059.
Constantine X. or XI., Ducas, 1059–1067.
Eudocia (in the name of her sons, Michael VII., Andronicus and Constantine, and with her second husband, Romanus IV.), 1067–1071.
Michael VII. (see above), 1071–1078.
Nicephorus III., Botaniates, 1078–1081.

COMNENIAN DYNASTY

Alexius I., Comnenus, 1081–1118.
John II., or Calojohannes, Comnenus, 1118–1143.
Manuel I., Comnenus, 1143–1180.
Alexius II., Comnenus, 1180–1183.
Andronicus I., Comnenus, 1183–1185.

THE ANGELIAN DYNASTY

Isaac II., Angelus, 1185–1195.
Alexius III., Angelus, 1195–1203.
Isaac II. (restored), } 1203.
Alexius II., Angelus, } 1204.
Alexius V., Ducas, 1204.

LATIN EMPERORS OF THE EAST

Baldwin I., 1204–1206.
Henry of Flanders, 1206–1216.
Peter of Courtenay, 1216–1219.
Yolande, 1219–1221.
Robert, 1221–1228.
John of Brienne, 1229–1237.
Baldwin II., 1237–1261.

NICÆAN EMPERORS

Theodore I., Lascaris, 1206–22.
John III., Ducas, 1222–54.
Theodore II., Ducas, 1254–58.
John IV., Ducas, 1258–60.

THE EMPIRE RESTORED: THE PALEOLOGI

Michael VIII., Paleologus, 1261–82.
Andronicus II., Paleologus, 1282–1328.
Andronicus III., Paleologus, 1328–41.
John V., Paleologus, 1341–91.
John VI., Cantacuzenus, 1347–1354.
Manuel II., 1391–1425.
John VII., 1425–48.
Constantine XI., 1448–53.

BYZANTINES. In numismatics, the term applied to coins of the Byzantine Empire. Byzantine coins are of gold, silver, and bronze; bear impressions distinct from those of the earlier Roman coins; and were copied in several countries where the Byzantine standard was adopted. The commercial relations of the Eastern Empire served to distribute its coinage over almost all the then known world. It was current in India, as well as in the north of Europe. Consult Saulcy, *Essai de classification de suites monétaires byzantines* (Metz, 1836), and see BESANTS.

BYZANTIUM, bĭ-zăn′-shĭ-ŭm (Gk. Βυζάντιον, *Byzantion*). A city which stood on the Thracian Bosporus, at the east end of the Propontis. It was founded about B.C. 660, by Dorian colonists, probably from Megara, and rapidly rose in importance as a seat of commerce. Its position was at once secure and enchanting; it commanded the shores of Europe and Asia, and had magnificent facilities for trade. After a time of subjugation under Darius Hystaspis, Byzantium was occupied by the Spartan general Pausanias. Later the city joined the Delian League, and its importance is shown by its large contributions. At the time of the Samian revolt (B.C. 440), Byzantium seems to have tried to withdraw, but reappears in the tribute lists two years later, and remained loyal to Athens until B.C. 411, when it joined Sparta. Retaken by Alcibiades (B.C. 409), it was again captured by Lysander after the battle of Ægospotami. Spartan tyranny led to a change of feeling, and about B.C. 390 Thrasybulus, the Athenian, reestablished the democracy, and before B.C. 378 Byzantium concluded a treaty of alliance with Athens. This friendship was of short duration, and finally, in B.C. 357, Byzantium leagued itself with Chios, Rhodes, and King Mausolus II. of Caria, in the Social War. In B.C. 341-40 Philip of Macedon advanced against the city, and, under the influence of Demosthenes, the citizens once more joined Athens. Under Alexander the Great and his successors, Byzantium retained its independence, but for some years after B.C. 278 was subject to a heavy tribute imposed by the Celts. The duties imposed to meet this burden led to a war with Rhodes, in which the city was supported by Attalus I. of Pergamum. During the Roman wars Byzantium seems to have supported Rome, and, as a result, in spite of some suffering in the Mithridatic wars, enjoyed considerable prosperity. In the civil war between Septimius Severus and Pescennius Niger, Byzantium sided with the latter. It was, therefore, besieged by Severus, and, after a brave defense of three years' duration, was captured in A.D. 196 and reduced to ruins. Severus, repenting the desolation which he had made, rebuilt a part of the city, ornamented it with baths, porticoes, etc., and restored to the inhabitants their ancient privileges. In A.D. 330, after the defeat of Licinius, Constantine made the city the capital of the Roman Empire, under the name of Constantinople (q.v.).

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C

C The third letter in the Latin, as in all alphabets, like the Romance and English, that are derived from it. In position the letter *c* corresponds to the Greek gamma(Γ) from which its form is actually derived through curvature or rounding. Its shape is ultimately traceable, it is thought, to a hieroglyphic pictograph for a throne. See ALPHABET.

PHONETIC CHARACTER. In sound the Latin *c* originally had the same force as the Greek gamma (Γ) from which it is adapted, and this old value is seen in such Latin abbreviations of proper names as C. for Gaius, Cn. for Gnæus; but in Latin *C* later began to take on the force and function of *K*, which was falling into disuse, and a new letter *G* (a modification of *C*) was introduced to represent that voiced guttural *g*-sound. (See G.) The *k*-sound of *c* continued in Latin down to at least the Eighth Century of the Christian Era; and that is also its power in the Anglo-Saxon or Old English, when 'king' is written *cyning*, and 'queen' *cwēn*, as there was no *q* during that period. The later differentiation or changes of the sound of *c* from the old stop or *k*-sound in *come* to the hissing or sibilant *s*-sound in *cetaceous*, with similar modifications, is largely due to the influence of a following *i*, *e*. These front vowels being farther forward in the mouth than *a*, *o*, *u*, tend to change the character of the checked sound into a split or hiss. As examples of such sibilant developments, compare the pronunciation of Latin *Cicero* (Kikero), Italian *Chichero*, English *Sisero*, or again the common English pronunciation of *vici*, 'I conquered' ('vīsī' instead of 'wēkē'), in *veni*, *vidi*, *vici*. Of like character is such an interchange as Latin *centum*, 'hundred;' Sanskrit, *śata*. Examples of palatalization or splitting of *c* to *ch*, before *i*, *e* are especially common from Anglo-Saxon into modern English, through the Southern Dialect—e.g. AS. *cild* (*kild*), Eng. *child;* AS. *ceorl*, Eng. *churl;* AS. *sēcan*, Eng. *seck* and *beseech;* or, again Lat. *caput*, 'head;' Fr. *chef*, Eng. *chief;* Lat. *canto*, Eng. *chant*. The phonetic laws governing such interchanges as *c* with *g*, *h* in the Indo-Germanic languages may be better understood by pronouncing in succession the syllabes *ac*, *ca* (with perfect closure), *ag*, *ga* (with the same closure, but voiced), and *ah*, *ha* (with imperfect closure); hence, such alternates as Lat. *ager*, 'field,' Eng. *acre*; Lat. *duc* (lead, draw), Eng. *tug;* Lat. *canis*, 'dog,' Gk. *κυν-*, *kun-;* AS. *hun-d*, 'hound.' (See PHONETIC LAWS.) In usage, as a letter compared with *k*, the Germanic alphabets, which are under obligation to the Greek as well as to the Latin, adopted *k*, from the Greek *kappa*, to represent the guttural sound. For this reason, *c* in German and Swedish, etc., hardly occurs outside of words of Romance origin. In Modern English *c* is practically superfluous, as far as sound-representation is necessarily concerned; the letter *k* might easily take its place in recording the stop-sound of *c* before *a*, *o*, *u*, and the letter *s* might readily be substituted for the hissing sound of *c* before *e*, *i*.

AS ABBREVIATION. In music C is the first tone, or keynote of the diatonic scale of C major. C = 100; C. = Centigrade (thermometer scale); B.C. = before Christ; c. = *cent*, *centime*, etc.; and it is used in some other familiar abbreviations.

CAABA, kä'bȧ *or* kā'ȧ-bȧ. See KAABA.

CAAING (ką'īng) **WHALE** (Scotch *ca*, *caa*, to drive), or BLACKFISH. A large, porpoiselike cetacean, of the Killer family (Delphinidæ) and genus Globiocephalus, principally characterized by its globose head. They go in large schools, crowding after a leader; and as they yield a fair amount of oil similar (but inferior) to sperm-oil, and their flesh is savory, they are incidentally an object of the sea-chase. The caaing whale proper (*Globiocephalus melas*) is 20 feet long, black, with a white abdominal area, has very long and narrow pectoral fins, and inhabits the colder parts of the Atlantic, appearing on our coast southward to New York, south of which it is replaced by a short-finned black species (*Globiocephalus brachypterus*). The Pacific has a widespread species (*Globiocephalus Scammoni*), wholly black, and much pursued by whalemen. The food of all is mainly squids, but fish are also eaten. See WHALE.

CAAMA, kä'mȧ, or KAAMA. (1) A small South African fox or fennec (*Fennecus caama*), now rare, whose fur is valuable. It has the habits of a fennec (q.v.), and lives largely on the eggs and young of ostriches and other ground-building birds. It is also called 'asse.' (2) See HARTBEEST.

CAAZAPA, kä'ȧ-sä'pȧ. A town of the Republic of Paraguay, situated 25 miles south of Villa Rica, with which it is connected by rail-

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road (Map: Paraguay, F 9). It is the centre of a fertile agricultural region. Population, about 12,000.

CAB. See CARRIAGE.

CABABISCH, kä-bä'bêsh. An Arab tribe in Africa, inhabiting the immense deserts of eastern Sudan, between Dongola, Darfur, and Kordofan.

CABAL' (Fr. *cabale*, from *cabbala*, on account of its secrecy). The designation of an unpopular English ministry (1667-73), composed of Clifford, Ashley, Buckingham, Arlington, and Lauderdale, the initials of whose names coincidently spelt Cabal.

CABALLERO, kä'bä-lyä'rô, FERNAN (1797-1877). The pseudonym of Cecilia Böhl von Faber, a Spanish novelist. She was born in Switzerland and educated in Germany, but in 1813 accompanied her father to Spain, and soon became enthusiastically attached to her adopted country. She was married three times, her last husband being a lawyer named Arrom. Her first novel, *La Gaviota*, was published in 1849, and was followed by many others, the chief of which are: *The Alvareda Family* (1880); *Clemencia* (1887); and *Elia*. She also published the first collection ever made of Spanish popular tales and poems, *Cuentas y poesias populares andaluces* (1859). Her principal novels have been translated into most European languages.

CABANATUAN, kä-bä'nä-twän'. A town of Luzon, Philippines, in the Province of Nueva Ecija, situated 16 miles north of San Isidro. It has a telegraph station. Population, in 1898, 12,000.

CABANEL, kä'bä'nël', ALEXANDRE (1823-89). A French painter. He was born in Montpellier, September 28, 1823, studied with Picot, and was practically, during the latter years of his life, the unofficial head of French art, inasmuch as he was consulted concerning all functions of which art formed a part. He devoted himself after 1860 mainly to portrait painting, and he was peculiarly fitted, by his taste and distinction of style, to portray aristocratic France. His portraits always possessed the distinguished air which we associate with the bearers of old names of the Faubourg Saint-Germain. He also painted subjects from romantic literature and history. He was a member of the Institute and of the Académie des Beaux Arts, where he was a professor for many years, turning out from his class more successful competitors for the Prix de Rome than any other instructor in that institution. Among his imaginative works were: "Francesca da Rimini;" "Agläe;" and "The Birth of Venus." A large number of his portraits were painted for Americans; that of Miss Catharine Wolfe is now in the possession of the Metropolitan Museum, New York. At the same museum are his "Queen Vashti and King Ahasuerus" and "Birth of Venus." Consult Stranathan, *A History of French Painting* (New York, 1899).

CABANIS, kä'bä-nēs', JEAN LOUIS (1816—). A German ornithologist, born in Berlin, and educated at the university there. In 1839-41 he made ornithologic researches in North and South Carolina, and in 1849 was appointed custodian of the ornithological collections of the Berlin Zoölogical Museum. The investigations which had so important an effect in determining a natural system of classification were published by him first (1847) in Wiegmann's *Archiv für Naturgeschichte*, and more fully in the *Museum Heineanum* (4 parts, Halberstadt, 1850-63). He founded the *Journal für Ornithologie* in 1853. His other works include the ornithological portions of Schomburgk's *Reisen in Britisch-Guayana* (Berlin, 1848), and of von der Decken's *Reisen in Ostafrika* (Berlin, 1869).

CABANIS, PIERRE JEAN GEORGES (1757-1808). A French physician and philosopher. He was born in Cosnac; studied in Paris, and in the year 1773 went to Warsaw as secretary to a Polish magnate. On his return to Paris, he was for some time engaged in literary pursuits, from which he turned his attention to the study of medicine. During the Revolution, whose tendencies he fully approved, he became the warm friend and physician of Mirabeau. After the death of the latter, in order to refute the charge of having poisoned him, Cabanis published the *Journal de la maladie et de la mort de Honoré de Mirabeau* (1791). Among the papers of Mirabeau was found an extensive work on public education in the handwriting of Cabanis. This had been used by Mirabeau in his public discourses. Cabanis took a leading part in the reorganization of the French schools of medicine and held several professorships in them. He was one of the Council of Five Hundred, and afterwards a member of the Senate. The contributions of Cabanis to philosophy and science may be briefly summed up as follows: In the first place, he was the first to demonstrate empirically the reciprocal influence and the ultimate unity of life and mind, a unity which Herbert Spencer presents as the fundamental principle of inductive psychology. Further, Cabanis was the first to prove that the newly born living being is not "like a musical instrument which in itself contains neither sounds nor harmony," but that it has more or less well-defined instincts and inclinations; that the form and development of ideas are caused not only by physical agents from without, but also by internal (visceral) impressions—a principle which is at the very foundation of an important part of psychology. In his psychological investigations Cabanis steered clear of metaphysics. Thus he remained strictly within the domain of experiment when inquiring into the origin of psychological impressions and into the influence of age, sex, temperament, disease, diet, climate, etc., on the development of ideas, instincts, and passions. His scientific views on subjects of this nature have led many to believe that Cabanis was a materialist and an atheist. It must be borne in mind, however, that when thought is studied in its dependence on the brain, it could not possibly be treated but as a function of that organ. And if Cabanis speaks of the brain from a physiological point of view as assimilating impressions and secreting thought, just as the stomach digests food, he is not therefore necessarily a materialist. As a matter of fact, in his metaphysical *Lettres sur les causes premières*, in which he formulates his dreams of the ultimate nature of the ego, he clearly expresses his belief in a spiritual and immortal soul and in a personal God. The best edition of Cabanis's chief work, the *Rapports du physique et du moral de l'homme*, was published by Piesse

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(Paris, 1844). Consult Dubois, *Examen des doctrines de Cabanis* (2 vols., Paris, 1842).

CAB'ARET (Fr., of disputed origin; Low Lat. *caparetum*, from Lat. *caupo*, huckster, innkeeper, has been suggested). A tavern; a public house where beer and spirits are retailed.

CABARRUS, kä'bä'rus', FRANÇOIS, Comte de (1752-1810). A Spanish financier of French birth. He organized the San Carlos Bank and a company for trade with the Philippine Islands; was one of the Council of Finance under Charles III., and proposed many reforms. Under Charles IV. he was accused of embezzlement and was imprisoned, but was soon released and raised to the rank of count. Joseph Bonaparte made him Minister of Finance, in which office he died. His daughter Thérèse, under the name of Mme. Tallien, afterwards Princess of Chimay, was conspicuous in the closing days of the French Revolution.

CABAT, kä'bä', NICOLAS LOUIS (1812-93). A French painter, born in Paris. He was a pupil of Flers, and became one of the leaders of the so-called realistic landscape school. His works include "Pond at Ville d'Avray" (1834); "Winter Day" (1836); "A Spring in the Wood" (1864); "A Morning in the Park of Magnet" (1877).

CABATUAN, kä'bä-twän'. A city of the Province of Iloilo, on the island of Panay, Philippines. It is situated on the River Tigum, and is connected by roads with the important towns on the island. Population, in 1898, about 18,000.

CABBAGE (OF. *cabus* in *chou cabus*, headed cole, OHG. *Kabuz*, Ger. *Kappus*, *Kappes*, from Lat. *caput*, head) (*Brassica oleracea*). A plant in general cultivation for culinary purposes and for feeding cattle. It is a native of the rocky shores of Great Britain and other parts of Europe, and in its wild state is generally from a foot to two feet high. It has been cultivated in Europe from time immemorial and has developed into several different forms, such as cabbage, kale (q.v.), kohl rabi (q.v.), cauliflower (q.v.), and Brussels sprouts (q.v.).

The wild cabbage has smooth, sea-green leaves, waved and variously indented; under domestication these have developed into a head, which is the part eaten.

There are two general classes of cabbages—smooth-leaved and wrinkled-leaved. The smooth-leaved cabbages may be either green or red, the head may be conical, oblong, round, or flat, and there are early, medium, and late maturing kinds. Red cabbage is chiefly esteemed for pickling; while green cabbage is the kind most generally grown in the garden and for market. More than 100 varieties are in cultivation in the United States. The wrinkled-leaved or Savoy cabbage is a cabbage of excellent quality, but is little grown, because it is not so productive as the common green kind. Cabbage demands a rich loam soil with plenty of manure. Seed for the early crop is sown in the hotbed. The plants are set in the field, as soon in spring as the frost is out of the ground, in rows three feet apart and two feet distant in the row. For the late crop the seed is sown in beds or in hills in the open in May. The early cabbage will mature in July, while the late crop may not be harvested until freezing weather. Cabbage may be winter-stored by putting in pits head down and covering with straw and earth or by storing in a cold, damp cellar. The tree-cabbage or cow-cabbage is a variety cultivated for cattle, especially in the Channel Islands and the north of France, the leaves of which do not close together into compact heads, but which is remarkable for its great height, reaching, when it is in flower, 10 feet on rich soil.

CABBAGE DISEASES. Cabbage is subject to two parasitic diseases, both of which are often very destructive. The first of these is clubroot, due to a low fungus, *Plasmodiophora brassicæ*, which causes peculiar swellings and outgrowths from the roots of the cabbage, often the whole root system being involved. (See CLUBROOT.) The other disease is a brown or black rot caused by attacks of bacteria, *Pseudomonas campestris*. It has been known in the United States for a dozen years, and has become widely distributed. It is known to occur also in the west of Europe, and is a destructive disease, often devastating whole fields. The disease attacks the cabbage at any stage of growth and often dwarfs the heads or makes them one-sided. If severe, no heads are formed, and the whole plant may be killed. Frequently the heads rot and fall off, but this is due to other agencies than the disease itself. Cut stumps of diseased cabbage show brown or black rings, and these may be traced into the head. On the leaves the margins become yellow and the veins black. The disease seems to enter by the leaves and progresses toward the stem. In many cases the leaves fall off, leaving bare stumps. The disease attacks, in addition to cabbage, turnips, cauliflower, kale, and rape. On the turnip it causes an internal brown rot. It seems to gain entrance through the gnawing of insects, slugs, etc. It remains in the soil for some time, just how long is not known, and is spread through manure and rubbish. For remedial measures it is advised to rotate the crop, destroy all cabbage insects, pay strict attention to the seed-bed, and plant on new soil whenever possible.

CABBAGE-BARK. See ANDIRA.

CABBAGE INSECTS. Many insects infest cabbage-plants, the chief of which are as follows:

Cabbage-Aphis.—A plant-louse (*Aphis brassicæ*) brownish-black above, light-green below, which infests the leaves of cabbages and turnips in both Europe and America. See APHIDS. *Cabbage-Bug.*—A pentatomid bug (*Margantia histrionica*) called the 'harlequin,' on account of its brilliant coloring (black, yellow, and red), which has spread within the last half-century from Central America throughout the United States and plays havoc with cabbages and similar plants. It hibernates in tufts of grass and weeds, and attacks the young plants; a strong wash of lime-water is recommended as a remedy.

Cabbage-Butterfly.—A name common to several species of white butterflies of the family Pieridæ, whose larvæ, known as cabbage-worms or kale-worms, feed on the leaves of the cabbage and other cruciferous plants. About a dozen species occur in North America, the most destructive of which is *Pieris rapæ*, a European species introduced by way of Canada about 1860, and now spread over nearly all the United States. In the North it is three-brooded, and in the South is probably even more prolific. Its caterpillar has the green color of the cabbage with a lemon-yellow dorsal band; and it not only eats

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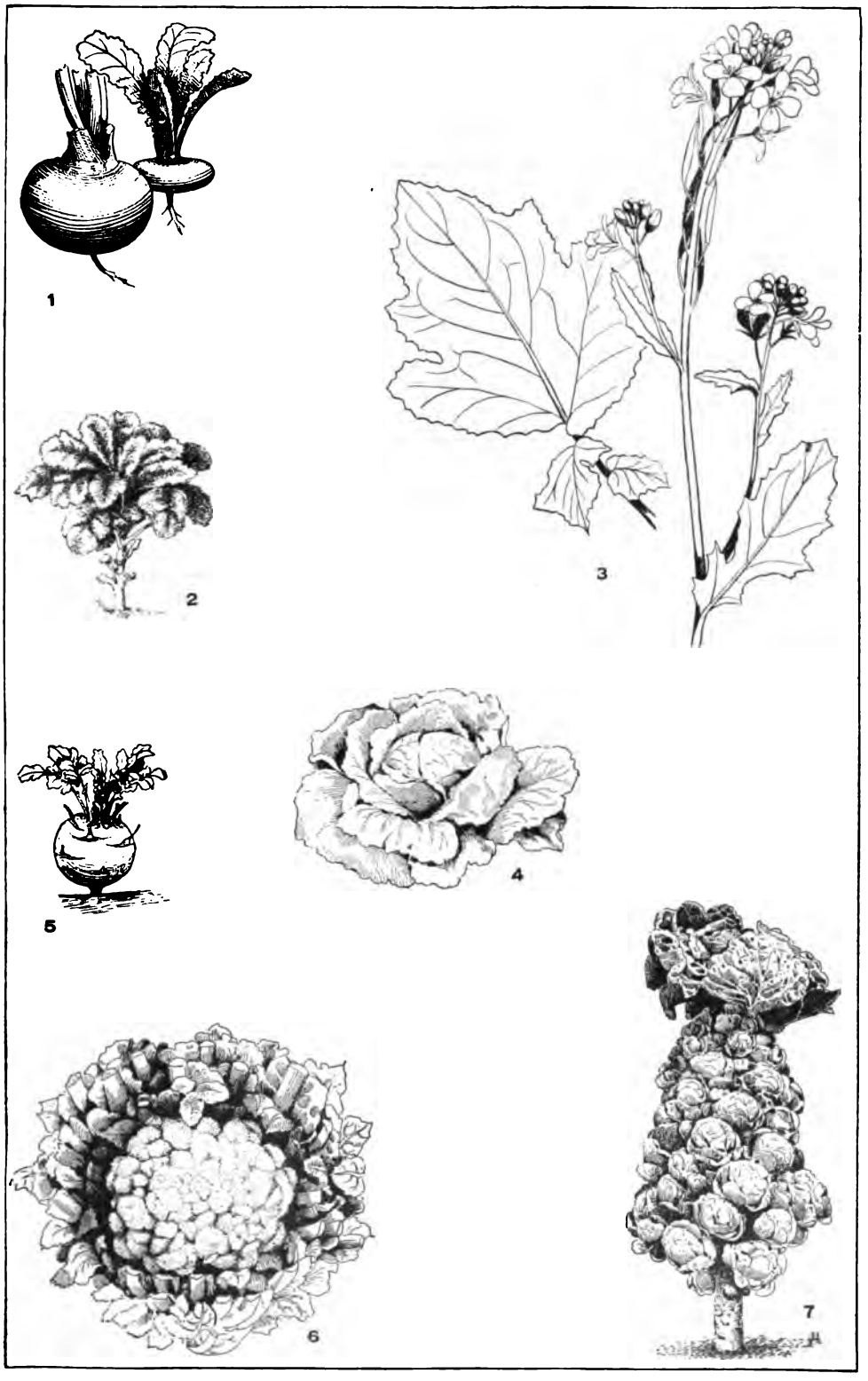
CABBAGE AND ALLIES



1. TURNIPS (Brassica campestris).
2. KALE (Brassica oleracea).
3. BLACK MUSTARD (Brassica nigra).
4. CABBAGE (Brassica oleracea var.).
5. KOHLRABI (Brassica oleracea var.).
6. CAULIFLOWER (Brassica oleracea var.).
7. BRUSSELS SPROUTS (Brassica oleracea var.).

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the leaves before heading-time of the plant, but burrows through the heads. Since Paris green and other poisons cannot be used on the cabbage, this is a difficult pest to combat. Pyrethrum and kerosene emulsions are most to be relied upon, and must be applied before the cabbage heads. The pupa is bare, and suspended by means of a caudal attachment and a medium girdle. The butterfly is white and pale yellow, the fore wings tipped with black; the female has two additional dots and the male one. As in all other cases of introduced pests, the cabbage butterfly does not cause as much damage now as when first introduced. Either it has acquired new parasites and other foes which keep down its numbers, or its old ones have been able to overtake it in the new country. *Pieris oleracea* is a native white form, with little or no black markings, of the northern part of the United States and southern Canada; its larvæ may also feed on the cabbage, as well as turnips, radish, cauliflower, mustard, and various other plants of economic value to man. *Pieris protodice*, whose wings are marked with grayish brown, occurs over nearly the whole of the United States; its larvæ, striped with alternate golden and greenish purple bands, may likewise feed on cabbage. There is a very marked sexual dimorphism in this species, the female being much the more darkly marked. *Pieris brassicæ* and *Pieris napi* are two other European agricultural pests of this same family, and several very beautiful species occur in South America. Our native forms are diminishing in numbers, since they cannot well compete with the hardy foreign *Pieris rapæ*.

Cabbage-Cutworm.—The destructive larva of a cabbage-moth. *Cabbage-Flea.*—A flea-beetle (q.v.) which attacks this and similar plants, as *Haltica consobrina;* there are many forms. *Cabbage-Fly.*—A small gray fly (*Phorbia brassicæ*) whose maggot preys upon the roots of cabbages; it is related to the housefly and is one of a group of garden-pests, such as the turnip-fly, onion-fly, etc. *Cabbage-Moth.*—A noctuid moth (*Mamestra picta*) whose larva is called the zebra caterpillar, being yellowish, marked by three longitudinal bands of black. It feeds on cabbage and turnip leaves and also on the cranberry. The change to the brown pupa is made in the ground in the autumn. The chestnut-brown fore wings of the moth are mottled with dark brown and white; the hind wings are pale yellow. The chrysalids should be destroyed whenever dug up with the soil, and the caterpillars should be removed from the plant and destroyed. Grooves in the soil, encircling the plants and filled with tar, gas-lime, or quicklime, are said to be a protective. *Cabbage-Worm.*—Any caterpillar injurious to cabbage; specifically that of the cabbage-butterfly.

CABBAGE-PALM, or **CABBAGE-TREE.** A name given in different countries to different species of palm, the large terminal bud of which is eaten like cabbage. The cabbage-palm of the West Indies is *Areca oleracea*, or *Oreodoxa oleracea*. The Southern United States also have their cabbage-palm, or cabbage-tree, otherwise called the palmetto (*Sabal palmetto*). See ARECA; PALMETTO; PALMS.

CABBAGE-TREE. See ANDIRA.

CAB'BALA (Med. Lat., Heb. *qabbālāh*, reception, as of traditional doctrine, from *qibbēl*, to receive, accept, admit). The designation of a mystical system of philosophy which arose among the Jews at the beginning of the common era, as a reaction against the sober and austere form assumed by Rabbinical Judaism. It attained a great vogue after the Twelfth Century, spread among Christian scholars in the Fifteenth and Sixteenth centuries, and still prevails among the Jews of eastern Europe, though now dying out. Its adherents claimed that their doctrine rested on a revelation made to Abraham, and, according to others, to Adam through the angel Raziel. The teachings were orally transmitted to the days of Moses, who in turn transmitted them to Joshua. By Joshua they were communicated to the seventy elders, and since that time passed down without interruption through chosen individuals until circumstances arose which rendered it desirable to convey the mystic lore in permanent written form. There are two written sources recognized by the Cabbalists—(1) the Sefer Jezirah, 'Book of Creation,' and (2) Sefer Zohar, 'Book of Light,' commonly known as the Zohar. The former is ascribed to Rabbi Akiba (died A.D. 135); the latter to Simeon ben Jochai, a pupil of Akiba. The Sefer Jezirah is couched in a Hebrew similar to that found in the Mishnah, but the work now extant under that name cannot date back earlier than the Eighth Century, and may be considerably later; the Zohar, written in a rather obscure Aramaic, belongs to the Twelfth or Thirteenth Century of our era, and was probably composed by Moses de Leon of Spain. The Sefer Jezirah consists of a series of monologues ascribed to Abraham, in which the patriarch sets forth how he came to the recognition of the true God, and then establishes in a series of aphorisms the harmony between created things on the one side, the thirty-two ways of wisdom, the ten fundamental numbers, and the twenty-two letters of the Hebrew alphabet on the other, as manifested by the divine will. A Sefer Jezirah is referred to in the Babylonian and Jerusalem Talmuds; but while it can hardly be identical with the book now extant under that name, yet our Sefer Jezirah represents a point of view which is not far removed from the tendency manifested in certain portions of the Talmud itself to interpret the doctrines of Judaism in a mystical sense. Ezekiel's vision of the heavenly chariot drawn by cherubim (see CHERUB), and the mysteries of creation as described in Genesis, furnished the points of departure for mystical speculations regarding the divine nature. The dangers involved in such speculations were recognized by the rabbis, and yet we find the best of them prone to indulge in them. The significance attached in the Sefer Jezirah to the letters of the alphabet is paralleled by the principle of Gematria (the term for the numerical sum of the letters comprising a word), which is recognized in the Talmud as an exegetical principle. The Sefer Jezirah, however, passes far beyond the current of mystic thought to be detected in the Talmud. It endeavors to explain all things as an emanation of the one Being, and that nothing exists but this Being and its manifestations. Passing still further, it endeavors to show the evolution of one Being itself, which, becoming conscious of itself, is transformed from a virtual

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into an actual Being, capable of manifesting itself. The manifestations of its Being are of two kinds—as thought and as word. As thought it is the general intelligence; as word it includes the general as well as the specific ideas, distinguished from one another and expressed by combinations of the letters of the alphabet. The teachings of the Sefer Jezirah may be summed up as follows: (1) There are four fundamental principles, one always the emanation of the other. (a) The first is the breath of the living God, without beginning or end; (b) breath of breaths, a condensation of the primeval breath; (c) primeval waters, an emanation of the breath of breaths; (d) primeval fire, arising from the primeval waters. (2) Everything in the universe forms an external circle. Primeval elements are combined and again dissolved. (3) In all manifestations the law of contraries prevails. These doctrines are more fully developed, considerably amplified, and set forth in great detail, in the Zohar, which has been properly designated as the Bible of the Cabbalists. The name is based on Dan. xii. 3, with which verse the book begins. The Zohar is in the form of a homiletical commentary on the fifty-four divisions into which the Pentateuch is, according to Jewish tradition, divided. The Old Testament characters and events are not interpreted in a literal sense, but everything is viewed as symbolical. Mystical thoughts are woven into the sacred name of God, each letter being specially taken up, and even the vowels and accents do not escape this process of interpretation. There are various older books than the Zohar in which the Cabbalistic doctrines are set forth, and numerous later ones; but there is none which enjoys such authority among Cabbalists.

In its developed form, and on the basis of the various works which, besides the Sefer Jezirah and the Zohar, may be regarded as authoritative sources, the religious philosophy of the Cabbala may be summarized as follows:

(1) In regard to God, the Cabbala teaches that He is the original principle of All Being, without end and without limitations. Hence the common designation of God in Cabbalistic works is En-Sof—i.e. without end. He is absolutely perfect and unchangeable. Human wisdom cannot fathom His Being, and hence no definition can be given of Him nor any conception be formed of Him. He is the Secret of Secrets, the First of the First, the Oldest of the Oldest, the Ultimate Principle.

(2) Creation, according to the Cabbala, is a process of emanation. There are ten divine emanations, known as the ten Sephiroth (lit. enumerations). The first four (as above set forth), Breath, Breath of Breaths or Air, Water, Fire, one emanating from the other. Upon these four Sephiroth follow six directions of space—height, depth, east, west, south, and north. Besides being called Sephiroth, they are also designated as tools used by God at creation. Out of air the intelligence in the universe is formed; out of water, the material world; out of fire, the spiritual universe (angels and the divine throne). At this point, however, differences of opinion among Cabbalists and considerable confusion of ideas arise. It is not made clear whether these ten Sephiroth represent real acts of creation or merely emanations by means of which His essence becomes clear to us; and, again, it is uncertain whether the Sephiroth are independent beings intermediate between God and the material world, or merely manifestations of the Divine Being himself. The ten Sephiroth in the developed Cabbala are denominated: (1) Crown, (2) Wisdom, (3) Intelligence, (4) Love, (5) Justice (also called Might and Fear), (6) Beauty (also called Mercy), (7) Victory, (8) Splendor, (9) Foundation, (10) Kingdom. These ten Sephiroth are variously subdivided as Sephiroth of the world and Sephiroth of construction, or into three groups as metaphysical, spiritual, and physical Sephiroth. The Sephiroth were commonly pictured by the Cabbalists under a human form, and the ten emanations divided among his various organs and limbs, Crown representing the head, Wisdom the brain, and Intelligence the heart; while Love, Justice, and Beauty corresponded to the right arm, left arm, and breast respectively, with Victory, Splendor, and Foundation symbolized by the right and left thigh and the genital organs respectively. 'Kingdom' rests under his feet, while God towers above his head.

(3) There are two classes of Sephiroth: (a) Heavenly or Sephiroth of light; (b) Sephiroth of darkness and wickedness. The Sephiroth of darkness produce the evil demons, at the head of whom stands Samael. Through the demons the work of creation is constantly threatened with destruction.

(4) The end of the powers of evil can be brought about through the triumph of morality and goodness among men; and that again is dependent upon the supremacy of the spirit of man over his desires. When the mind of man is in full control, the Messiah will appear and restore the world to its original perfect state.

(5) Man himself is a type of a divine heavenly man known as Adam Kadmon. He represents in his person the whole scheme of creation, and is, therefore, a microcosmus. All parts of the human body have, therefore, a symbolical significance.

(6) As a means of penetrating into the divine secrets, writing was revealed, and hence words, letters, vowels, and accents all symbolize certain teachings, the secrets of which are only revealed to those who can penetrate beneath the surface. It is in the combination of letters and endless meanings attached to the numerical value of such combinations that Cabbalistic writers indulge, each one trying to outdo the other in mystical interpretations.

From this rapid survey it is evident that various factors are involved in Cabbalistic teachings. The theory of emanation that lies at the basis is an echo of the Idealistic philosophy of Plato, in combination with Neo-Platonism.

Christian Gnosticism represents a second factor that accounts for some of the mystical aspects of the Cabbala, while in its developed form traces of mystical ideas in Islam may be detected. The influence of Cabbalistic teachings on Judaism was fraught with serious consequences. It led to divisions, and to the formation of new sects which shut themselves from the influence of culture and were hostile to reasoning that did not conform to Cabbalistic teaching; and when the Cabbala spread to the Christian world, its influ-

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ence, though not so extensive, was most baneful, and checked for a time the progress of rational philosophic thought.

BIBLIOGRAPHY. Latin translation of the Sefer Jezirah, with five commentaries (Mantua, 1562); German translation by Meyer (Leipzig, 1830); English translation by Kalisch (New York, 1877). Consult, also: Tholuck, *Wichtige Stellen des rabbinischen Buches Sohar* (Berlin, 1824); Joel, *Die Religionsphilosophie des Sohar* (Leipzig, 1849); Franck, *La Kabbale* (Paris, 1843); Jellinek, *Beiträge zur Geschichte der Kabbala* (Leipzig, 1851-52); Ginsburg, *The Kabbala* (London, 1865); Rubin, *Heidentum und Kabbala* (Vienna, 1893); id., "Kabbala," in Hamburger, *Realencyclopädie für Bibel und Talmud*, II. (Strelitz, 1883); Bloch, "Die Jüdische Mystik und Kabbala," in Winter and Wünsche, *Jüdische Literatur*, Vol. III. (Trier, 1896); Wünsche, "Kabbala," in Herzog, *Realencyklopädie für protestantische Theologie und Kirche*, 2d ed., Vol. IX. (Leipzig, 1901); Graetz, *Geschichte der Juden von den ältesten Zeiten bis auf die Gegenwart* (Berlin and Leipzig, 1853-70); Jost, *Geschichte des Judentums und seiner Sekten* (Leipzig, 1857-59); Cassel, *Geschichte der jüdischen Litteratur* (Berlin, 1872-73); Ueberweg, *Grundriss der Geschichte der Philosophie* (8th ed., Berlin, 1896-97); Ritter, *Geschichte der Philosophie* (12 vols., Hamburg, 1829-53); Tennemann, *Geschichte der Philosophie* (11 vols., Leipzig, 1798-1819).

CABEZA DE VACA, kä-bä'thä dä vä'kä. See CABEGA DE VACA, NUÑEZ.

CABEI'RI, or **CABIRI** (Lat., Gk. *Κάβειροι*, *Kabeiroi*). Divinities worshiped anciently in many parts of the Greek world—in Lemnos, Imbros, Samothrace, and at certain points on the adjacent coasts of Europe and Asia Minor, as well as in a few other places, as at Thebes in Bœotia. The myth of the Cabeiri is obscure, and variously given by different authors. In Lemnos they were represented as sons of Hephæstus, whose ministers they were and whom they assisted at his labors. Being by nature beneficent, they gave the Argonauts a kind welcome when the latter touched at the island. In Samothrace they were honored as the protectors of sailors in time of peril. These Grecian Cabeiri, two, three, or four in number, are said to have been worshiped by the early Pelasgian inhabitants of the Grecian islands, and are to be distinguished from another group of eight (called *Kabirim*), which were of Phœnician origin. Among the later Greeks and the Romans the tendency was to identify the two sets, the process of identification being assisted by the meaning of the word *Kabirim* (the strong, the powerful, the Greek Cabeiri being also called *θεοὶ μεγάλοι, δυνατοί, ἰσχυροί*).

Consult: Lobeck, *Aglaophamus* (Königsberg, 1829); Schömann, *Griechische Altertümer*, II. (Berlin, 1897); Preller, *Griechische Mythologie*, I. (Berlin, 1894); Welcker, *Griechische Götterlehre*, I., III. (Göttingen, 1857-62); Lenormant, in Daremberg and Saglio, *Dictionnaire des antiquités*, I. (Paris, 1892).

CA'BELL, JAMES LAURENCE (1813-89). An American physician. He was born in Nelson County, Va.; graduated at the University of Pennsylvania; studied medicine there, in Baltimore, Philadelphia, and Paris; and became professor of anatomy and surgery in the University of Virginia. He had charge of the Confederate military hospitals during the Civil War, and subsequently was chairman of the National Sanitary Conference and president of the National Board of Health. He published *The Testimony of Modern Science to the Unity of Mankind* (1858).

CA'BER, TOSSING THE (Gael. *cabar*, pole). An athletic exercise or feat practiced wherever there are Scottish athletic contests. A beam heavier at one end than the other is held perpendicularly against the chest, small end downward, and tossed so as to fall on the heavy end and turn over, the farthest toss and straightest fall winning. Competitions where the powers of the opponents are unknown are generally started with a caber of 24 or 25 feet, from which the thick end is sawn off by degrees, until the proper length is reached. The usual size is 16 feet long, with ends of 5 and 11 inches diameter respectively.

CABES, kä'bĕs, or **GABES** (anciently, *Tacape*). An important seaport and capital of the Tunisian Province of Arad, situated on the Gulf of Cabes, on the eastern coast of Tunis (Map: Africa, F 1). The harbor is too shallow for larger vessels, but the trade of the port is nevertheless of considerable importance. The place, which practically consists of several villages, contains an Arabic school and a French garrison, and is the seat of the Governor of the province. The population was 12,600 in 1896.

CABES, or **GABES**, GULF OF. An open gulf of the Mediterranean, on the east coast of Tunis. Its mouth, about 75 miles across, is partly blocked on the extreme south by Jerba Island (Map: Africa, F 1). The town of Cabes is at the head of the bay.

CABESTAING, kä'bĕs-tăn', **CABESTANH**, or **CABESTAN**, GUILLAUME DE. A Provençal poet belonging to the later half of the Twelfth Century. Some of his verses have been published in the collection of Raynouard. Consult the study by Hüffer (Berlin, 1869).

CABET, kä'bä', ETIENNE (1788-1856). A French Communist, born January 1, 1788, at Dijon. Cabet was a true product of the intellectual and social reconstructionists of the era of the Revolution. He was educated as a lawyer, became an efficient Government official as Procureur-Général in Corsica, representing the Government of Louis Philippe, after having headed an insurrectionary committee and participated actively in the July Revolution of 1830. In 1831 he took his seat with the extreme Radicals in the Chamber of Deputies as representative from Côte d'Or. His Radicalism and his revolutionary denunciations aroused the active opposition of the Government, which gave him the choice between two years' imprisonment and five years of exile. He chose the latter, and lived in England studying and thinking out his social philosophy, and finally accepting communism as the only solution of the problems presented by excessive wealth and excessive poverty side by side in modern society. He returned to France in 1839, and published *Voyage en Icarie*, a popular romance, setting forth his new communistic ideas, which won followers by the thousands and drove its author to take steps to realize his Utopia. In 1841 he revived the *Populaire* (orig-

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inally founded by him in 1833), which was widely read by French workingmen, and from 1843 to 1847 he printed an Icarian almanac, a number of controversial pamphlets, a book on Christianity (*Le vrai christianisme suivant Jésus Christ*), which makes out Christ's mission to be to establish social equality, and contrasts primitive Christianity with modern ecclesiasticism to the disparagement of the latter, and a popular history of the French Revolutions from 1789 to 1830, in five volumes. In 1847 there were probably 400,000 adherents of the Icarian school, and Cabet turned his attention to a project for a real Icarian colony in America. Influenced by Owen he took a large tract of land in Texas, and sixty-nine men entered into a social contract, making Cabet the director-in-chief for the first ten years, and embarked from Havre, February 3, 1848, to take up land on the Red River in Texas. Cabet came later at the head of a second and smaller band. Texas did not prove to be the Utopia looked for, and, ravaged by disease, about one-third of the colonists returned to France, while the remainder went to Nauvoo in Hancock County, Ill., on a beautiful bend of the Mississippi River, where the Mormons had made a prosperous town before public opinion had driven them to Utah. The new community at Nauvoo prospered, but the location was regarded only as a temporary abiding-place, and Government land was acquired as early as 1852 in southwestern Iowa with a view to removing the community thither, which removal was finally accomplished in 1860 after a split in the community at Nauvoo, part going to Cheltenham, near Saint Louis. Cabet died suddenly of apoplexy in Saint Louis, November 8, 1856, a broken-hearted and disappointed man. He was the inspirer of modern communism at its best, and a writer of more literary merit and moral worth than the calumny which contemporaneous writers in France succeeded in weaving about his name would lead us to believe.

The failure of the Cheltenham colony, to which faction Cabet belonged, and which therefore was recognized in France as the true Icaria, came quickly, and the subsequent history of the Icarian community in Adams County, Iowa, was a record of struggle with debt until 1863, when war prices gave their agricultural products exceptional values. This temporary relief was followed by years of privation, declining numbers, and vanishing hopes. Another split occurred in 1879 between the younger and older members of the community, resulting in a division of the property, the younger element retaining the title and old habitat, while the 'party of the elders' accepted, with a bonus of $1500, the eastern division of the land, and organized a 'New Icarian Community' about one mile distant from the original village. Consult Shaw, *Icaria: A Study in Communistic History* (New York, 1884). See COMMUNISM.

CABINDA, kä-bēn'dä, or KABINDA. A seaport town of Portuguese West Africa, situated in latitude 5° 30′ S., and longitude 12° 10′ E., north of the estuary of the Congo (Map: Africa, B 4). Since the introduction of a high tariff in Congo Free State, Cabinda has increased its commerce considerably. The name Cabinda is also applied to the entire portion of Portuguese West Africa situated north of the Congo.

CABINET (Fr. dim. of *cabane, cabine*, cabin, from Gael. and Irish *caban*, booth, hut, tent). Originally a small chamber set apart for some special purpose, such as private interviews, or study, or for collections of objects of art or curiosity. Sovereigns, ministers, and other high officials always had such cabinets in connection with larger reception-rooms. The term then came to be applied to the closets or show-cases in which the collections were kept in many such rooms; and even to the collections themselves. Cabinet collections are always supposed to be of small objects, and in this sense we speak of a cabinet picture. Cabinet-work is, by extension, the art of fine woodwork such as was used at one time largely in making the delicate decorative furniture for such rooms and collections.

CABINET (originally the closet or private apartment of a monarch, in which he consults with his most trusted advisers; hence, sometimes as a term of contempt, those who frequent the king's closet. See CABINET above). The collective body of official advisers of the executive head of the State. In modern times the term is usually limited to the ministers, or heads of the great departments of State, in a constitutional government, but there is no reason for restricting it to such heads of departments, nor in refusing the title to the chosen advisers of an absolute monarch. The powers and functions of cabinets vary greatly, even in modern constitutional States.

In England the Cabinet is virtually a committee of the House of Commons, and it constitutes the supreme executive authority of the realm. In the United States the term is applied to the group of executive heads of the Federal Government, who have no authority outside of their several departments, and whose function as Cabinet ministers is purely an advisory one. The Cabinets of the two countries are alike in this respect, however, that they are composed exclusively of the members of the dominant political party—a result insured in England by the fact that the Cabinet, being a committee of the legislature, is dependent on a party majority for its continuance in office, and in the United States by the assumed obligation of the President to appoint only members of his own political party to the chief offices of the State. In the constitutional governments of the Continent of Europe and in Japan, as well as in the self-governing British colonies, the model of the English Cabinet has usually been followed. There being in those countries, with the exception of France and Switzerland, no opportunity for the popular will to express itself directly in the choice of the chief executive, popular government is conceived of as signifying parliamentary government, and the attempt is made, with varying degrees of success, to secure to the legislature a substantial measure of executive power through a responsible Cabinet, subject to its control. It is only in Great Britain that this transfer of executive power from the titular head of the State to the legislature has become complete, and that we find *Cabinet Government* in its most highly developed form. In France, however, it is practiced with a large measure of success, and is completely accepted in theory, whereas, in most of the Continental States which have adopted the device of the parliamentary Cabinet, it is still imperfectly accepted and applied.

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France is the only important instance of the adoption of Cabinet government by a republic. In the free States, in which the popular will finds expression in the choice of the head of the State, it has not usually been deemed necessary to deprive that head of his executive authority, nor to set up a competing executive, deriving its authority less directly from the people. Hence in Switzerland and the republic of the Western World, the American model—a Cabinet responsible not to the legislature, but to the President or Governor—has been adopted. In this system the Cabinet, as a body, has no official existence, the persons composing it being individually, and not collectively, responsible to the head of the State, and usually holding their offices as well as their advisory relation to him subject to his will. In the Federal Government of the United States this relation is clearly indicated in the phrase 'the President's Cabinet,' by which his official advisors are commonly referred to. Accordingly, the dismissal of a Cabinet minister, or even of the whole Cabinet, may be effected without altering the political complexion or the policy of the administration; whereas, under the English system, the Cabinet is 'the Government,' its members stand or fall together, and its dismissal involves, in the full sense of the phrase, a change of government.

The advantages and disadvantages of these two contrasting forms of popular government are elsewhere set forth (see GOVERNMENT; PARLIAMENT), but the fact should here be noticed that a Cabinet representing the legislature and responsible to it is necessarily deeply concerned in the legislative as well as in the executive business of the State. The British Ministry, representing the dominant political party in Parliament, has assumed complete control of legislation; and this, it is conceived, must always be the tendency of an executive so constituted and so related to the legislating body. Whereas a Cabinet of the American type (even when made up, as it usually is, of party leaders), having no official relation to the legislative branch of the Government, is strictly confined to its foreign executive functions. In some of the foreign States which have adopted the American form of executive, the members of the Cabinet have a place—for purposes of discussion if not of voting—in the legislature; but in the United States the fear of impairing the mutual independence of the legislative and the executive departments of the Government has caused a similar tendency to be successfully resisted.

The President's Cabinet.—The Constitution of the United States made no provision for the creation of executive departments, but vested the sole executive power in the President. The several executive departments through which the President exercises this power have been created by successive acts of Congress, under the authority conferred by Art. I., Sec. 8, par. 18, of the Constitution, authorizing the Congress "to make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this Constitution in the Government of the United States, or in any department or officer thereof." At the first session of Congress, in 1789, the departments of State (first called Foreign Affairs), of the Treasury, and of War (which included naval as well as military affairs) were established; and the heads of these departments (called Secretaries of State, War, and the Treasury, respectively), together with the Attorney-General, who was then a part of the judicial establishment, constituted the first President's Cabinet. The office of Postmaster-General, created upon the organization of the post-office system in 1794, was not deemed of sufficient importance and dignity to entitle its incumbent to a seat in the President's councils, and it was not until 1829 that, by the action of President Jackson, the Postmaster-Generalship became a Cabinet office. In the meantime the Navy Department had been set apart from that of war, and the Secretary of the Navy created a Cabinet officer, in 1798. In the same way, fifty-one years later, the Department of Internal Affairs was set apart from the Department of State, and the office of Secretary of the Interior created and as recently as 1889 the Department of Agriculture was established, and its head, the Secretary of Agriculture, added to the list of Cabinet officers.

It is obvious that there is no natural order of precedence among the chiefs of the great executive departments of the Government, and prior to 1886 there was no legal discrimination between them. But in that year the succession of the members of the Cabinet to the Presidential office, in the event of the death or disability of both the President and Vice-President, was established by act of Congress, in the order in which they are named above. Even under this statute, however, there is no justification for the journalistic practice of referring to the Secretary of State as the 'premier' of the administration, there being no analogy between his position and that of the Prime Minister in a Cabinet of the English model. The President's Cabinet, therefore, consists of his officers of administration, whom he calls into consultation when he desires their advice. They hold their meetings in a room in his official residence, no record is kept of their proceedings, and he is not bound to heed their advice.

The British Cabinet.—There is a curious lack of correspondence between the legal and actual functions of the Cabinet in the Government of Great Britain. Legally it is merely a committee of the Privy Council, originally chosen by the King for advice "in his most secret affairs." Actually it is, as has been said, the executive committee of the House of Commons, entirely independent of the Crown and of the Privy Council, and wielding the supreme authority of Parliament in the administration of the State. It has had a long and varied history. Prior to 1782 it contained honorary or 'non-efficient,' as well as active and 'efficient' members. Since that date it has been made up exclusively "of the persons whose responsible situations in office require their being members of it." The number of these may vary somewhat, but modern usage has fixed the number at not less than eleven. These are usually the First Lord of the Treasury, the Lord Chancelor, the Lord President of the (Privy) Council, the Lord Privy Seal, the Chancelor of the Exchequer, the First Lord of the Admiralty, and the five principal secretaries of State, viz. for Home Affairs, for Foreign Affairs, for the Colonies, for India, and for War. To these may be added the Chief Secretary for Ireland, the Chancelor of the Duchy of Lancaster, the Postmaster-General, the President of the Board of

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Trade, and one or two other high officials, but the tendency at present is to limit the number to the principal officers of State above enumerated. All of these officers of the Government are appointed on the recommendation of the Prime Minister, who makes up his Cabinet from among them, and who may or may not hold one or more of those offices himself. He presides at meetings of the Cabinet, but his preëminence gives him no legal control over that body or over its individual members. Its deliberations are secret, and it always acts as a unit, the defection of a member involving his retirement from the Cabinet and from the office held by him. All of its members are also members of one or the other of the Houses of Parliament and take part in the proceedings of that House.

The term 'Cabinet' is sometimes applied, by courtesy, in the United States, to the principal officials of a State Government, who may be called together by the Governor to advise him on questions of policy, and sometimes, in the same sense, the chief executive officers of a municipal government are called a 'Mayor's Cabinet.'

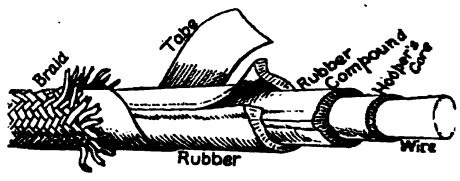
The literature of the subject is very extensive and will be found more fully referred to under the general heads of GOVERNMENT and PARLIAMENT. The historical evolution of the British Cabinet and its relation to Parliament and the Crown are fully set forth in Anson, *The Law and Custom of the Constitution* (Oxford, 1892); and in Todd, *On Parliamentary Government in England* (2d ed., London, 1887). Interesting comparisons of the British and American systems of cabinet government are to be found in Bagehot, *The English Constitution* (London and Boston, 1873), and Bryce, *The American Commonwealth* (3d ed., London and New York, 1900).

CABI'RI. See CABEIRI.

CABLE (OF., Low Lat. *capulum, caplum*, a strong [holding] rope, from Lat. *capere*, to take, hold). A strong chain or rope used to hold a ship to her anchor. Practically all cables are now made of chain, only very small craft using rope. See ANCHOR, and CHAIN.

CABLE, ATLANTIC. See ATLANTIC TELEGRAPH, and SUBMARINE TELEGRAPH.

CABLE, ELECTRIC. Strictly speaking, a combination of two or more separately insulated electric conductors with a protective covering or armor. Popular usage sanctions the extension of the term electric cable to simple insulated and armored wires and to ropes of twisted wires without either insulation or armor. Retaining for the present the limited definition first given, an electric cable may be described as consisting structurally of, first, the conducting wires or core; second, the insulating material separating the several wires; and third, the protective covering or armor. Cables may be aërial, submarine, or underground, depending on their position; classed according to their uses they are telegraph, telephone, electric-light, and power cables, and as to the arrangement of their conductors they are straightway or twisted. Cables for different purposes differ somewhat in the details of their construction, but their general construction is substantially similar, and the following description of underground cables for electric lighting will answer for cables for other purposes, with such exceptions as will be noted farther on. Electric-light cables for use underground are of two classes, according as the insulation is or is not moisture-proof. In the first class the insulation is rubber bitumen and the lead covering is for protection from mechanical injuries only. The second class is insulated with jute, hemp, or paper impregnated with a wax, or resinous compound, and the lead covering for this cable is absolutely necessary on account of the hygroscopic nature of the insulation. The manufacture of a cable of the first class may be described briefly as follows: To insulate the conductor it is first wrapped round with one or more layers of pure rubber tape put on spirally, the direction of the spiral being reversed for each successive layer. On top of this rubber compound is applied in two or more separate coatings, each coat being put on by pressing the partially formed cable with two strips of rubber compound, one above and one below it, between a pair of rollers which fold each strip half around the cable and press the edges of the two strips together so as to make a good joint along each side. When a sufficient number of layers of rubber compound have been



AN UNDERGROUND CABLE FOR ELECTRIC LIGHTING.

put on to give the requisite thickness, the core is tightly bound in a spiral wrapping of prepared rubber tape and then vulcanized. After this the cable is tested to determine the efficiency of its insulation. If this test is satisfactory the cable is taken to the taping and braiding machine, where the external covering of tapes and braiding is put on. The next step is to armor the cable with lead. This may be done by drawing the cable into a lead tube, which is then drawn through a die and made to fit the core tightly; or the last cover may be put on in a hydraulic press, the hot lead being forced out through an annular die around the cable. The accompanying sketch shows the make-up of an electric-light underground cable before it is armored. Of cables of the second class the Siemens cable and the paper cable are representative examples. In the Siemens cable the conductor is wrapped with jute and impregnated with a special bituminous compound mixed with heavy oil, and is then covered with lead. Paper cable consists of paper wound on in strips spirally over the conductor, and as each strip is applied the whole is passed through a die which presses it into a compact mass. The core is then dried at a temperature of 250° F., to expel the moisture from the paper, and immersed in a bath of specially prepared compound, from which it passes directly to the lead-covering press.

The standard type of cable for telephone work consists of 400 insulated wires twisted in pairs with about three-inch lay; and the pairs are cabled in reverse layers, forming a cable about two inches in diameter. The 200-pair cable is used for main routes, but 100-pair, 50-pair, and smaller cables are used for distribution. The insulation consists of dry paper wound loosely on the wire, and the whole is armored with lead

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pipe. Submarine cables for telegraph and telephone lines are much like the underground cables of the first class for electric lighting, but are commonly armored with strands of iron wire. (See SUBMARINE TELEGRAPH.) Aërial cables for long-distance power transmission are commonly neither insulated nor armored. For example, the aluminium cable for the 181-mile transmission line of the Bay Counties Power Company, in California, is seven-eighths of an inch in outside diameter and consists of 37 aluminium wires twisted into a rope without insulation or armor. These cables carry a current of 40,000 volts. Aërial cables for local distribution are usually insulated. This insulation is usually in two parts: one of insulating material impervious to moisture placed next to the wire, and the other of some substance which resists abrasion or other mechanical injury. In the most expensive grades of wire more than two coatings are employed. Various special cables are employed. For example, there is in use in New York City a three-conductor cable for transmitting three-phase lighting current from the main stations to substations. This cable may be broadly described as consisting of three separate insulated cables of 37 wires, twisted together with the spaces filled with jute and the whole first insulated and then armored with lead pipe. Concentric cables are another special form. They consist first of one wire core of twisted wires, second a thick layer of insulation, third a layer of spirally wound wire or wire strands, fourth a layer of insulation, and fifth a protective coating or armor. See SUBMARINE TELEGRAPH. Consult the sections relating to electric cable construction to be found in Crocker, *Electric Lighting*, Vol. II. (New York, 1901); Foster, *Electrical Engineer's Pocket-Book* (New York, 1901); Houston, *A Dictionary of Electrical Words, Terms, and Phrases* (New York, 1894).

CA'BLE, GEORGE WASHINGTON (1844—). An American novelist and writer on social questions. He was born in New Orleans, October 12, 1844. On his father's side he is of Virginia stock, and on his mother's side of New England ancestry. After scant schooling, Cable became a clerk in New Orleans, and in 1863 entered the Confederate Army, where he served in the Fourth Mississippi Cavalry. At the close of the war he became a civil engineer, but malarial fever drove him back to mercantile life and he was employed as accountant in a firm of cotton factors till 1879. During this period he wrote for the New Orleans *Picayune*, under the pseudonym of Drop Shot, and it was at this date that he published his first volume of fiction, *Old Creole Days*, a collection of short stories dealing with the then unexploited types of social life in New Orleans and Louisiana. This was followed by *The Grandissimes* (1880), which is probably his best work; *Madame Delphine* (1881); *Dr. Sevier* (1883); *Bonaventure* (1888); *Strange, True Stories of Louisiana* (1889); and, less valuable and interesting, *John March, Southerner* (1894). These constitute an original and unique body of fiction. His most recent novels are *The Cavalier* (1901), and *Bylow Hill* (1902). Cable is less popularly known in his more expository books, *The Creoles of Louisiana* (1884), *The Silent South* (1885), and *The Negro Question* (1890). In 1885 Cable removed to New England, living first at Simsbury, Conn., and later at Northampton, Mass. (1886). The value of Cable's best work is recognized by all students and critics of American literature, and appreciations of his work are to be found in contemporary reviews.

CABLE MOLDING. In architecture, a molding cut in the form of a rope, the twisting being prominently shown. It was much used in later Norman work.

CABLEWAY. A hoisting and conveying device, employing a suspended cable as a trackway, and differing from ropeways (q.v.), which cannot be used for hoisting, being limited to the sole function of conveying. While ropeways date back to the early part of the Nineteenth Century, the cableway had its origin practically in an inclined hoisting and conveying device invented about 1860, and still extensively used in the slate-quarries of Vermont and Pennsylvania. These first cableways consisted of a winding-engine with one drum, a suspended cable, a cable-carriage traveling on the suspended cable, a fall block adapted to rise and fall from the cable-carriage, and a hoisting-rope operating the same. The suspended cable or track cable of these cableways ran on an incline from the top of a trestle tower to a ground anchor. Horizontal cableways of short span were used in the construction of the piers of the Saint Louis Bridge. As the span of cableways became greater the necessity arose of supporting the hoisting-rope or fall rope between the tower and the carriage. The devices for supporting the fall-rope are termed fall-rope carriers. One of the earliest arrangements of this sort consisted of a series of blocks, at the upper end of each of which was a sheave riding on the track cable and through the lower end of which was a hole for the fall rope. These blocks were connected by a light chain, one end of which was also connected to the head tower and the other end to the carriage; as the carriage moved out from the head tower it strung the blocks at intervals along the track cable, and as the fall rope passed through a hole in each block it was supported and prevented from sagging unduly; as the carriage returned to the tower it gathered up the blocks into a bunch at the tower. This system of fall-rope carriers was objectionable chiefly because of the weight of the connecting chain, and although it is still used in its essential features, the heavy chains have been replaced by light steel wire connections and other important reductions made in the weight.

A second form of fall-rope carrier arrangement much used may be described as follows: An auxiliary rope is suspended above the main cable and held in a parallel position to the main cable by passing under wheels in the cable-carriage. On this rope a series of buttons are secured whose diameter increases with the distance from the head tower; slots in the heads of the carriers, corresponding to the diameter of the buttons, allow each of the carriers in passing out from the head tower to be stopped at its proper button. The carriage distributes and picks up the carriers in its forward and return journeys.

Described briefly, the modern cableway consists of a heavy steel cable called a track cable or main cable, suspended with a slight sag between the tops of two timber towers so placed that the main cable spans the quarry, canal, foundation pit, or other work on which it is to be used. On this

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main cable a carriage runs, being drawn back and forth by an endless rope passing around suitable sheaves at the tower-tops and operated by a special hoisting-engine mounted at the bottom of one of the towers. From the same engine a hoisting or fall rope passes to the top of the engine tower and thence through the fall-rope carriers to the carriage, where it connects with a fall block by means of which the load is hoisted. The fall-rope carriers have already been described. The operation of the cableway is as follows: The carriage is run out on the main cable to a point directly over the place from which the load is to be picked up; the fall block is then lowered by running out the fall rope, and when it reaches the ground the load is attached; the fall rope is then hauled in, raising the load high enough to clear obstructions, and, finally, the carriage is hauled to the point of the main cable directly over the place where the load is to be deposited, and the fall rope then runs out, lowering the load to the ground. In work such as canal excavation, for example, where the purpose is simply to hoist the load of earth or rock, convey it to the bank, and deposit it as quickly as possible, the discharge of the load is effected in mid-air by special mechanism. In other cases the towers carrying the cables are mounted on wheels so that the whole cableway plant may be moved easily from one position to another.

The traveling cableway is particularly adapted to canal work, where the towers are placed on opposite banks, with the cables spanning the channel, and are moved along the banks as the excavation progresses. Cableways are built of varying capacities and lengths of span, depending in each case upon the work which they are required to perform. They are sometimes, though seldom, used for passenger traffic. Mr. Spencer Miller, the inventor of the Miller cableway, places the following limitations on the practical applications of cableways: Span (single), 2000 feet; load, 25 tons; speed of travel, 1800 feet per minute; and speed of hoist, 900 feet per minute. The average practice, however, is about as follows: Span, 600 to 1200 feet; loads, 3 to 7 tons; speed of travel, 500 to 1000 feet per minute; speed of hoist, 150 to 300 feet per minute. The files of the engineering journals and the excellent printed matter prepared by manufacturers of cableways should be consulted for further information on this subject.

CABLING. The cylindrical molding by which the hollows in the flutes of columns and pilasters are sometimes partially filled, though seldom beyond the third part of the height from the ground.

CABOCHED, kȧ-bŏsht′, or **CABOSHED** (OF. *caboche*, It. *capocchia*, knob, from *capo*, Lat. *caput*, head). An heraldic term, denoting the head of an animal, borne without any part of the neck, and exhibited full face.

CABOCHIENS, kȧ′bô′shyăn′. A political faction in Paris, in the reign of Charles VII., named from one of the leaders, Simon Caboche. It comprised a large number of members of the butchers' trade, and was organized in the years 1411-13, to obtain reforms from the royal Government, and to aid the party of Burgundy against the Armagnacs. Many Government officials sympathized with the Cabochiens. They became quite powerful by the year 1413, organizing the Paris militia, exercising a general supervision of trade, and by a series of riots in the same year forcing Charles VII. to recognize their demands by letters patent. As a result, the Cabochiens reformed the whole royal administration; but a reaction occurred, the Armagnacs gained the upper hand, the Duke of Burgundy fled from Paris, and the fortunes of the Cabochiens waned. In 14[illegible] the guild of butchers was abolished and their privileges annulled.

CABOOL, kȧ-bōōl′. See KABUL.

CABOT, kăb′ot, GEORGE (1751-1823). An American politician. He was born in Salem, Mass.; studied for two years at Harvard College, and then went to sea and became a captain before reaching his majority. He was chosen to the Massachusetts Provincial Congress in 1775; was also a member of the State Constitutional Convention, and was United States Senator from 1791 to 1796. When the office of Secretary of the Navy was created, in 1798, he was appointed to it by President Adams, but he declined to serve, though he actually held the office for a month and thus became the first head of the Navy Department. In 1814 he was elected president of the famous Hartford Convention (q.v.). Consult Henry Cabot Lodge, *Life and Letters of George Cabot* (Boston, 1877).

CABOT, JOHN (1450-98). An Italian navigator sailing under the English flag. His native name was Giovanni Caboto, and he was born in Genoa. He removed to Venice at an early age, acquired citizenship there, and traded thence to all the important Mediterranean ports. About 1490 he removed to England, and settled in Bristol. If, as has been stated without any convincing historical authority, he was engaged by King Henry VII. to settle certain difficulties between the Danish Government and the English merchant-factors resident in that country, he must have acquired a position of some consequence. On March 5, 1496, he secured from King Henry VII. letters patent authorizing him to take possession of any lands he might discover. He sailed in May, 1497, and on June 24, after a rough passage, landed on the North American coast, probably near Cape Breton. He returned to England, where he landed on August 10, and was rewarded by the King with the post of Great Admiral. He began immediately to prepare for a second voyage, with the purpose of exploring and colonizing the newfound land. Several Bristol merchants cooperated to fit out a fleet, equipped with everything needed for the complete exploitation of a new country. Cabot set sail with five vessels in the spring of 1498. One of the ships put back and landed on the Irish coast, whence the crew returned to England with the news that the fleet had run into a severe storm, which had forced them to make for land. No further news was ever received of the fate of the discoverer or of his expedition. A number of early narratives, which are sometimes said to refer to this 1498 voyage, and speak of Cabot as sailing along the whole North American coast, from Florida to Newfoundland, probably describe a voyage made by Sebastian Cabot.

CABOT, SEBASTIAN (1475-1557). An English navigator, born in Venice. He was one of the three sons of John Cabot, his brothers being Lewis and Sanctus. There is no contemporary

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evidence that Sebastian accompanied his father on either of the two voyages to America, in 1497 or 1498. After his father's death, Sebastian took up the profession of navigation. He was also a cartographer of some repute, being employed to prepare the maps for an English military expedition to southwestern France (1512). He accompanied the English forces, and while away was induced to enter the service of the King of Spain. He soon rose to an influential position as the head of the Spanish navigation office, with the title of pilot-major, a post he held for 30 years. There is some evidence, however, that in 1517 or 1518 he led an English expedition in search of a northwest passage to Cathay. In 1526 Charles V. gave him the command of an expedition which was intended by its promoters to pass through the Strait of Magellan and trade in the Spice Islands. Acting probably under secret orders from the King, Cabot entered the estuary of the river which he afterwards named La Plata, in the hope of finding another passage through to the Pacific. Misled by the stories which he had heard from the Indians, who told him that silver and gold (really to be found in Peru) were to be had at the headwaters of this river, he spent three years in trying to reach these sources of wealth. As a result the undertaking turned out a ruinous failure, and Cabot, after his return to Spain in 1530, was tried and found legally culpable for the disaster. The King, however, pardoned him and restored him to his office as pilot-major. In 1548 Cabot went back to England, and accepted a pension from the Government of Edward VI. for his services as Great Pilot. He became governor of the company of Merchant Adventurers, and was a prime mover in organizing and equipping the expedition of Willoughby and Chancellor to Asia by the northeast sea route, in 1553, and that of Stephen Burrough by the same route in 1556. He died in the winter of 1557-58. The character of Sebastian Cabot has been variously estimated. English writers, supposing him to have been born in Bristol, eulogize his every trait and action. Consult Nicholls, *Remarkable Life of Sebastian Cabot* (London, 1869). In reaction against this view, consult Henry Harris, *John Cabot and His Son Sebastian* (London, 1896), than whom there is no more learned authority, and who describes him as a renegade and traitor, an unfilial boaster, without a single redeeming quality. The truth is presumably midway between these two extremes. Consult Winship, *Cabot Bibliography* (London, 1900).

CABRA, kä'brä (anciently, *Aegabro;* Sp. *cabra*, Lat. *capra*, goat). A town of Spain in the Province of Cordova, situated on the northern slope of the Sierra de Cabra, 47 miles southeast of Cordova (Map: Spain, C 4). It contains an old Moorish mosque, now a church, several monasteries, and a theatre. Population, in 1897, 12,363.

CABRAL, kä-bräl', or **CABRERA**, kä-brā'rä, Pedro Alvarez (1460-1526). A Portuguese navigator. His public life, as far as known, was limited to the brief period 1500-01, when he was in charge of a fleet fitted out by King Emmanuel, destined for the East Indies. With 13 vessels and about 1200 men Cabral left Lisbon on March 9, 1500, intending to follow the route previously taken by Vasco da Gama, by way of the Cape of Good Hope. Either to avoid storms or calms, he took a course west of that of Vasco da Gama, and was carried to the coast of Brazil by the strong southern equatorial current. Pinzon had touched on the northeastern coast of Brazil in the very beginning of the same year, somewhat north of where Cabral landed. Pinzon, however, did not seem to recognize the significance of his discovery, and Cabral regarded the coast as part of the Eastern Hemisphere, the non-Christian portions of which had been assigned to Portugal. He accordingly 'took possession' in the name of the Portuguese King, calling the country *Terra Sanctæ Crucis*. Had Columbus failed in his original enterprise, the New World would not long have remained unknown to Europe, for the Portuguese followed up this accidental discovery of Brazil, and would in this way have opened up the Western Continent. Leaving Brazil, Cabral sailed eastward to India, making important discoveries on the way. He founded a trading post at Calicut, and concluded the first commercial treaty of Portugal in India. On his return to Portugal, he was for some reason not retained in service, and sinks again into obscurity. "This adventure of Cabral's had interesting consequences. It set in motion the train of events which ended, after some years, in placing the name 'America' upon the map." Consult Fiske, *Discovery of America*, Vol. II. (Boston, 1892); Capistrano de Abreu, *Descobrimento do Brasil* (Rio de Janeiro, 1883).

CABRERA, kä-brā'rä (anciently, Lat. *Capraria*, goat island, from *caper*, *capra*, goat). One of the Balearic Islands (q.v.), situated about 10 miles south of Majorca (Map: Spain, G 3). It is about 3 miles in length and breadth, with an irregular coast. Fishing is the chief industry. Its permanent population amounts to only a few hundred. During the war in the Peninsula, Cabrera formed a Spanish depot for French prisoners, who were crowded by thousands into the desolate spot, and treated with great barbarity.

CABRERA BOBADILLA CERDA Y MENDOZA, bō'bä-dē'lyä thär'dä ē män-dō'thä, Luis Gerónymo Fernandez de (c.1590-1647). A Spanish administrator, born in Madrid. From 1629 to 1639 he was Viceroy of Peru. His administration was at the outset rendered difficult by the constant clamor for money on the part of the royal treasury. Spanish cruelty aroused among the Uru Indians of the Lake of Titicaca an insurrection, which in 1632-34 he arduously suppressed. It was during his viceroyalty that discovery was made of the febrifuge properties of cinchona bark, and that the third navigation of the Amazon was accomplished.

CABRERA, Ramon (1810-77). A leader of the Carlist party in Spain, born at Tortosa, in Catalonia. At the outbreak of the civil war, following on the death of Ferdinand VII., in 1833, Cabrera joined the Carlists (q.v.) and soon rose to a high command. Such was his reputation for cruelty that the Government general Mina had Cabrera's mother arrested and shot "to restrain by a just system of reprisals the excesses of the bloodthirsty Cabrera." After penetrating as far south as Andalusia, his forces were completely routed by the royal troops on the borders of Aragon, and he himself, severely wounded, escaped with difficulty. He soon reappeared at the head of 10,000 foot and 1600 horse. Invading the Province of Valencia, he overthrew the royal army at Buñol (February 18,

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1837), and again, on March 19, at Burjasot; but was in turn vanquished at Torre Blanca, and once more compelled to seek a hiding-place, but only to reappear soon after. Madrid itself was threatened by Cabrera, who about this time received from Don Carlos the title of Count of Morella for his vigorous defense of the fortress of that name, and was also appointed Governor-General of Aragon, Valencia, and Murcia. The Carlists now believed that the triumph of absolutism was approaching, when the treachery of the Carlist general Maroto changed the whole aspect of affairs, and Don Carlos fled from Spain. Cabrera held out until, hemmed in by Espartero, he was forced to quit the country, July, 1840. He then entered France, where he was taken prisoner, and confined for a short time in the fortress of Ham. In 1845, when Don Carlos renounced his rights to the throne in favor of his son, Count Montemolin, Cabrera accompanied the latter to England. On the outbreak of the French revolution in 1848, he renewed the struggle on behalf of absolutism in Spain, but the adventure proved a miserable failure, and after the encounter at Pasteral, January 27, 1849, he recrossed the Pyrenees, to live in retirement. He afterwards married an English lady, Miss Marianne Catherine Richards. When Alphonso XII. was proclaimed King of Spain, in 1875, Cabrera advised the Carlists to submit to him, chiefly because he was "a good son of the Church." He died May 24, 1877. Consult: Valras, *Don Carlos VII. et l'Espagne carliste* (Paris, 1876); Arjona, *Pages d'histoire du parti carliste: Charles VII. et Ramon Cabrera*, translated from the Spanish (Paris, 1875); Diaz and Cardenas, *Galería de Españoles célebres contemporáneos*, Vol. I. (Madrid, 1841).

CABRILLA, kȧ-brē'lyȧ (Sp.). One of several serranoid fishes, especially a grouper (q.v.) of Floridian and West Indian waters (*Epinephelus capreolus*); also the name of certain small fishes of the coast of Southern California.

CABUL, kȧ-bōōl'. See KABUL.

CACAO, kȧ-kā'ō *or* kā'kō, or **COCOA**, kō'kō (Sp., from Mex. *caca uatl*, coca-tree). The different kinds of cacao either consist of, or are prepared from, the seeds of trees of the genus Theobroma (Gk., 'food of the gods'), which contains a number of species, trees of moderate size with large, undivided leaves and clustered flowers, all natives of the tropical parts of America. By far the most important species of this genus is *Theobroma cacao*. It should not be confounded with the cocoa-tree, from which we get the cocoanut, or with the shrub *Erythroxylon coca*, from which the alkaloid cocaine is obtained. It is extensively cultivated in tropical America and the West Indies, and its cultivation has been introduced into some parts of Asia and Africa. It requires a deep, rich soil, heat, and moisture, for the most favorable growth. Sheltered valleys, free from hard winds, are desirable, and shade from other tall-growing, spreading trees is necessary. It generally rises with a bare stem 6 or 7 feet, dividing into many branches, and attaining a height of only 16 or 20 feet altogether, although it is sometimes twice that height. The fruit is somewhat like a cucumber in shape, and is 6 or 8 inches long, yellow, and red on the side next the sun; the rind is thick and warty, the pulp sweetish and not unpleasant; the seeds are numerous, compressed, and not unlike almonds, with a thin, pale, reddish-brown, fragile skin or shell, covering a dark-brown, oily, aromatic, bitter kernel, which consists mostly of the wrinkled cotyledons. These seeds are the cacao-beans of commerce. The cacao-tree produces larger seeds in cultivation than in a wild state. The tree bears in four or five years, attains its full vigor and productiveness in twelve years, and generally yields two principal crops in the year. When gathered, the fruit is subjected to four to seven days' fermentation in earthen vessels, or in heaps on the ground, or it is buried for a while in the earth, till the pulp becomes rotten. The latter method is said to produce the best cacao ('earthed cacao,' or *cacao terré*). The fermentation is induced by an unorganized ferment inherent in the pod, and upon the proper handling of the bean during this period largely depends the quality of the product. After fermentation the beans are hulled and are carefully dried under uniform conditions of heat and moisture. The average yield per tree under favorable conditions will reach 7 pounds annually of cured cacao. Usually, however, the yield is from 2 to 3 pounds per tree, or 400 to 600 pounds per acre.

In manufacturing cacao, the seeds are screened, roasted, and decorticated, the kernel being known as cocoa-nibs. The hulls make a cheap substitute known as *miserabile*. About two-thirds of the fat is removed and placed on the market in cakes known as cacao butter, and is thus used for emollients, pessaries, etc. The residue of the cacao-nibs is ground, boxed, and sold as 'cocoa,' or is pressed into cakes after being sweetened and is known as 'chocolate.'

Cacao is very nutritious. The principal constituent of cacao-beans is the soft, solid oil which forms more than 50 per cent. of the whole shelled bean, about 22 per cent. being starch, gum, mucilage, etc., and 17 per cent. being gluten and albumen. They contain also a crystallizable principle called theobromine (see THEOBROMINE; CAFFEINE). The following figures show the average of analyses of cocoa and chocolate bought in open market:

	Protein	Fat	Carbohydrates
Cocoa	21.6%	28.9%	37.7%
Chocolate	12.9	48.7	30.3

Nine-tenths of cocoa is assimilated in the system. For dietetic use, cocoa is prepared in several ways. It is made into chocolate (q.v.): it is eaten in the solid state in the form of cakes and bonbons, or is scraped down and treated with boiling water or milk. When cacao-nibs are infused with water like coffee, they yield a highly palatable beverage, which is much lighter than any other infusion of cacao. The large quantity of oily matter present in the bean tends to make the various infusions thick and heavy, so that they do not agree with some delicate stomachs. The annual consumption of cacao is upward of 100,000,000 pounds. An infusion of the broken and roasted shells of cacao-beans is sometimes used in the same way as tea or coffee. The pulp of the fruit is eaten in the countries in which the tree grows, and a kind of spirit

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s obtained from it by fermentation and distillation. For illustration, see BEVERAGE PLANTS.

CACCIANIGA, kä'chä-nē'gä, ANTONIO (1823—). An Italian author, born at Treviso. In 1848 he founded in Milan the satiric periodical *Lo Spirito Folletto*. After the revolution of 1848 he was for six years in exile, living as a journalist in Paris. Subsequently he was elected mayor (podestà) of Treviso and a Parliamentary Deputy. His works include: *Il procritta* (1853); *Bozzetti morali ed economici* (1869); *La vita campestre* (new ed., 1870); and *Villa Ortensia* (1876).

CACCINI, kä-chē'nē, GIULIO (c.1558-1618). An Italian musician, born in Rome, and often called Giulio Romano for that reason. He learned to sing and to play the lute under Scipione della Palla, and in 1578 went to Florence, where he spent most of his life. He is said to have been the first to emphasize the importance of musical accompaniment for the voice, and he illustrated the dramatic possibilities of this by accompanying himself on the theorbo while he sang a kind of recitation. The experiments of Caccini, Corsi, Bardi, Galilei, and others may fairly be called the beginnings of modern opera. He was the composer of *Euridice* (1600), a musical setting of the drama by Rinuccini, *Le nuove musiche* (1602), group of songs for a single voice; *Il combattimento d'Appolline col serpente;* and parts of several choruses.

CÁCERES, kä'thä-räs (anciently, Lat. *Castra Caecilia*). A town of Spain, capital of the Province of Cáceres, in Estremadura, situated on a river of the same name, 25 miles west of Trujillo, in a rich agricultural district (Map: Spain, B 3). It is famous for its bacon; has manufactures of linen, woolens, leather, hats, soap, etc., and controls a large trade in the produce of the district. Population, in 1897, 15,400.

CÁCERES, ANDRÉS AVELINO (1836—). A Peruvian statesman and soldier. He was born at Ayacucho, in southern Peru, November 10, 1836. At an early age he participated in the rising of Castillo, distinguished himself at the taking of Arequipa, and from 1857 to 1860 was military attaché to the Peruvian legation at Paris. He fought in the Chilean War (1879-83), in which he was raised to the rank of general. After the capture of Lima he became the head of the provisional government. In 1884, in trying to dislodge Iglesias, whom the Chileans had set up as President, he was repulsed before Lima, but he gathered a larger force, entered the city in the following year, and induced the President to refer the Presidential question to a popular election. The result was favorable to Cáceres, who was chosen President and inaugurated in June, 1886. In 1890 he was succeeded by Bermudez, and went soon afterwards as Peruvian Minister to France and Great Britain. Upon the expiration of Bermudez's term of office, in 1894, the adherents of Cáceres seized the government and forced the Congress to choose him President. The party of Piérola took up arms, Lima was besieged, and on March 18, 1895, the city was taken by assault after a murderous fight. In a treaty of peace concluded between the two factions, Cáceres resigned the Presidency, and soon afterwards fled the country. Piérola was elected President in his stead.

CÁCERES, NUEVA. See NUEVA CÁCERES.

CACHALOT, kăsh'ä-lŏt. See WHALE.

CACHE, kăsh (Fr., from *cacher*, to hide). The name given by parties of travelers in uninhabited parts of North America to places for concealing provisions and other articles. Designing to return on their tracks, they disburden themselves of what articles can be spared, and, to conceal them from Indians or others, construct places of deposit in the wilderness. A hole is dug to a depth of perhaps 6 or 8 feet and several feet broad, and, the articles being interred, the surface replaced with care and all traces of the excavation obliterated. The situation of the cache is afterwards found by some landmark or other sign. If containing provisions, the cache needs to be made to resist the depredations of animals, hence it is often covered with rocks. Prominently marked caches are built by expeditions in the Arctic regions as supply stations, or for the use of distressed mariners.

CACHEO, kä-shā'o, or **CACHEU**. A fortified town in Portuguese Guinea, West Africa, situated on the river Cacheo, about 10 miles inland (Map: Africa, C 3). It was founded in 1588 and has an estimated population of 15,000, mostly natives. It has some trade in ivory and gold-dust.

CACHEXIA, kä-kĕks'ĭ-ä (Neo-Lat., Gk. *καχεξία*, *kachexia*, from *κακός*, *kakos*, bad + *ἕξις*, *hexis*, state). A medical term used to denote a general condition of the body resulting from a wasting disease; a depreciated condition due to disordered nutrition and impoverished blood. The condition is noticeable in the case of persons suffering from malaria, cancer, tuberculosis, gout, kidney disease, etc. In the cachexia of kidney disease, for example, the face is thin, pale, and waxen, the ears semi-translucent, the lips pallid, the lower eyelids baggy and dark, the forehead at times swollen with fluid and pitting on pressure, the expression sad.

CACHOEIRA, kä-shwā'ē-rä (Portug., waterfall, cataract). A town in Brazil, situated on the Rio Paraguassu, 62 miles northwest of Bahia, with which it is connected by rail (Map: Brazil, K 6). The town manufactures tobacco and cigars, the suburb, Saint Felix, giving its name to the best brand of Brazilian tobacco. It also exports coffee, cotton, and fruits. Population, about 15,000.

CACHOLONG, kăsh'ō-lŏng (probably *Cach*, a river of Bokhara, where it was originally found + Kalmuck *chalong*, stone). An opaque milk-white, sometimes yellow or red, variety of opal. It has a conchoidal fracture and a pearly lustre, in consequence of which it is sometimes called *pearl opal*, or *mother-of-pearl opal*. It has also been found, associated with chalcedony, in Nova Scotia, on the Bay of Fundy.

CACHUCHA, kä-chōō'chä (Sp.). An Andalusian dance of much grace. Its origin is unknown. It is written in 3-4 time, and resembles the *bolero* (q.v.). The cachucha is usually danced with castanets. It was introduced on the stage by Fanny Elssler, in the ballet of *Le diable boiteux*.

CACIQUE, kä'sēk'. A title borne by the native princes or chiefs of Cuba, Haiti, Mexico, and Peru, besides other parts of America, at the time of Spanish discovery and exploration. In more recent times the title has been bestowed upon

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the chiefs of independent Indian tribes. Locke adopted this title in his *Fundamental Constitutions of Carolina* (1669). In this revival of feudal society there were to be, according to *The Grand Model*, two county dignitaries who should bear the title cacique, and rank next after the landgrave.

CACIQUE, or **CAS'SICAN** (Sp., from native Haitian). Any of several icterine birds of Central and South America, allied to the Baltimore oriole, and forming the genus Cassicus. They are noted for their intricately woven pensile nests, composed of grass or thin bark, in the form of a purse or pouch, sometimes a yard long, and suspended from the extremity of a branch of a tall tree, apparently to insure safety from monkeys and serpents. Several of these nests are often to be seen hanging from the branches of the same tree. (See Plate of PENSILE NESTS OF BIRDS.) The name 'cassican' is also given sometimes to the piping crow of Australia and Papua.

CAC'ODYL, or **KAK'ODYLE** (Gk. *κακώδης*, *kakōdēs*, ill-smelling + *ὕλη*, *hylē*, wood, stuff, matter). An organic substance composed of carbon, hydrogen, and arsenic. It is a highly poisonous liquid, spontaneously taking fire if exposed to the air. Its formula is $As_2(CH_3)_4$. Its *oxide*, $As_2(CH_3)_4O$, is obtained by distilling a mixture of arsenious oxide and potassium acetate; in the pure state it does not, like cacodyl, take fire on exposure to the air; it readily combines with acids to form salts, such as cacodyl chloride, $As(CH_3)_2CN$; cacodyl cyanide, $As(CH_3)_2CN$, etc. The *cacodyl group*, $As(CH_3)_2$, was the first metallo-organic radical known to chemists. Its discovery by Bunsen, following Wöhler and Liebig's discovery of the benzoyl group, had an important influence on the development of the science of organic chemistry.

CACOMISTLE, kăk'ō-mĭs-el (native Mex.). A small animal (*Bassariscus astutus*) of the raccoon family, inhabiting Mexico and adjacent parts of the United States. Its body is about 16 inches long, and its tail about 15. It is rather slender, with a sharp, fox-like face, and large, bright eyes, surrounded by light patches, which, with the erect ears, give an alert and pleasing expression to the countenance. The fur is long, soft, and light brown above, darker along the back, and the long, bushy tail has six or eight broad, white rings; the under parts are white. It has much the same habits as a raccoon, catching small mammals, birds, and insects, and is often tamed and regarded as a most pleasing pet among miners, who usually call it the American civet-cat. Consult *Bulletin Am. Mus. Nat. Hist.* (New York, 1895). See Plate of MINOR CARNIVORES.

CACOS, kä'kōs (Sp., pl. of *caco*, pickpocket). An epithet applied to the 'Separatist' Party of 1820 in Guatemala. A faction in Haiti has also received the name.

CACOUNA, kä'kōō-nâ. A picturesque and fashionable watering-place in Temiscouata County, Quebec, Canada (Map: Quebec, G 3). It is situated on the right bank of the Saint Lawrence River, 114 miles from Quebec. It contains numerous summer cottages of wealthy Canadians, has good hotels and boarding-houses, while a smooth, sandy beach affords admirable bathing facilities. It is also resorted to for trout-fishing and hunting. A small Indian settlement is located near the beach. Population, in 1891, 620; in 1901, 589.

CACTA'CEÆ. See CACTUS.

CACTUS (Lat., from Gk. *κάκτος*, *kaktos*). A general name given to the peculiar plants which belong to the family Cactaceæ. These plants have been specially adapted to the arid regions of America. They are chiefly displayed in Mexico, but are very abundant also along the Mexican border of the United States, and some of them extend even far north on the plains. They are also found to some extent more eastward, in the West Indies, and also southward in South America. Aside from a few African species, the 1000 known forms are restricted to America. However, the common prickly pear, a species of *Opuntia*, has been long naturalized throughout the Mediterranean region, where its fruit is known as the 'Indian fig.'

The peculiar habit of the family seems to have been the result of perennial drouth conditions, to which they have become better adapted, perhaps, than any other plant forms. The twofold problem which is presented to them is to prevent any unnecessary loss of water contained in their tissues, and to retain all of the scanty supply which reaches them. As a result, their bodies are very succulent, containing a large amount of water-storage tissue, which retains water with great tenacity. Their bodies are also very much reduced in surface exposure, leaves being abandoned, and the stem often assuming cylindrical to globular forms. The globular form is perhaps the most complete answer to the problem of reducing surface exposure and retaining mass. Instead of leaves and branches which appear upon ordinary plants, the cacus forms display various ephemeral or abortive structures, the most notable of which are the bristles and spines. The cactus forms are not all of compact habit, for species of *Pereskia* are climbing and woody, with well-developed leaves. The flowers of the group are usually conspicuous and remarkably brilliant in color. The largest forms are species of Cereus, with thick columnar and fluted bodies, bearing a few clumsy branches, and sometimes attaining a height of 50 or 60 feet. These tree-like columnar forms are especially well developed in the drainage basin of the Gulf of California, and sometimes occur in extensive masses known as 'cardon forests.'

About twenty genera of cacti are recognized, of which only five occur in the United States. The generic lines are, however, very uncertain and shifting, so that no definite number can be given. The most common genera are as follows: Mamillaria includes the globular to short cylindrical forms, which are not ribbed, but which have prominent tubercles bearing clusters of spines. It is the largest in point of numbers of all the genera, containing nearly three hundred species. Echinocactus also contains globular to short cylindrical forms, but they are strongly ribbed, and are usually larger than any of the Mamillaria forms. It is the second genus in point of numbers, containing about two hundred species. Cereus contains species with mostly elongated stems, which are stout, columnar, or sometimes

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CACTI

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1 NIGHT-BLOOMING CEREUS - CEREUS GRANDIFLORUS
2 WHIPPLES SPRING CACTUS - ECHINOCACTUS WHIPPLEI
3 NIPPLE CACTUS - MAMILLARIA MACROMERIS
4 ENGELMANN'S TUNA - OPUNTIA ENGELMANNI
5 ACKERMANN'S LEAF-CACTUS - PHYLLOCLADUS ACKERMANNI
6 GIANT CACTUS - CEREUS GIGANTEUS

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cylindrical, and always ribbed or angled. Species of Pilocereus are often seen in greenhouses, and resemble the columnar forms of Cereus, but have an abundance of white hairs instead of rigid spines, and are frequently spoken of as 'old-man cactus.' Opuntia contains about one hundred and fifty species, and includes forms which are branched and jointed, the joints being flat or cylindrical. The flat-jointed forms are the well-known 'prickly pears.' Consult: Engelmann and Bigelow, "Description of Cactaceæ," in *United States War Department Reports of Exploration for Railroad to the Pacific* (Washington, 1856); Kunzi, *Cactus; Its History, Classification, . . . and Therapeutical Application* (Albany, 1875); Coulter, *Preliminary Revision of the North American Species of Cactus, Anhalonium, and Lophophora* (Washington, 1894-98); and *Preliminary Revision of the North American Species of Echinocactus, Cereus, and Opuntia* (Washington, 1896).

CACTUS-WREN. See WREN.

CA'CUS. In Roman legend, a monstrous being (son of Vulcan, by some accounts) who dwelt in a cave on the Aventine Hill, before the foundation of Rome. When Hercules, returning to Greece with the cattle of Geryon, stopped to rest in the grassy plain by the Tiber, Cacus, selecting the most beautiful of the cows, drew them into his cave backward, by the tail, so that their tracks might not betray him; but their lowing, as Hercules, wonder-stricken, drove their mates away, attracted attention to the cave, and he slew Cacus. The story is told in Livy.

CADALSO, kä-däl'sô, or **CADAHALSO,** kä'dä-äl'sô, JOSÉ DE (1741-82). A Spanish poet, JOSÉ DE (1741-82). A Spanish poet of note, born in Cadiz. He distinguished himself in the war against Portgual, and rose to be colonel. At the siege of Gibraltar he was killed by the explosion of a bomb. His works include the tragedy *Sancho Garcia* (1771); the satire *Los Eruditos á la Violeta* (1772); and *Poesías* (1773). They appeared in a complete edition in 1818, as *Colección de obras en prosa y en verso* (Madrid).

CADA MOSTO, kä'dä mō'stô, or **CA DA MOSTO,** ALOIS, or LUIGI DA (c.1432-c.80). An Italian navigator and discoverer, born in Venice. He made some commercial voyages about the Mediterranean and the Atlantic, and in 1455, under commission of the Infante Dom Henrique of Portugal, sailed, by way of Senegal and Cape Verde, to the mouth of the Gambia. In 1456 he undertook a second journey, discovered the Cape Verde Islands, and thence reached the mouth of the Rio Grande. He wrote an exceedingly interesting account of his voyages, *El libro de la prima navigazione per oceano alle terre de' Nigri della Bassa Etiopia* (1507).

CADAS'TRAL SURVEY (from Fr. *cadastre*, 'a public register of the quantity, value, and ownership of the real property of a country'). A term applied to a topographical survey, in mapping which the various artificial and natural objects are drawn to exact scale instead of being exaggerated for the sake of clearness, as is usually done in ordinary topographic mapping. See SURVEYING.

CADDIS-FLY. A neuropteroid insect of the order Trichoptera, the larvæ of which, usually aquatic, are commonly known as case-worms. Caddis-flies show much resemblance to small moths, on account of their long antennæ, moth-like wings, and nocturnal flight. The body and wings are hairy, and some species possess scales. Four wings are generally present, but Thamastes has only the anterior pair, while in Anamalopteryx there is a curious dimorphism, the wings being quite short in the male, but of normal length in the female. They are seen mainly about streams and ponds, but a few are marine, and the genus Onoicyla is terrestrial. "The eggs are laid in a double mass, which is gelatinous and usually green in color. They are usually attached to the surface of some water plant. . . . The larvæ are all aquatic, . . . and they are nearly all protected by a case of some sort." These larvæ are long and cylindrical, with a hard head and thoracic segments, but soft abdomen, to cover which the worm forms a tubular shelter, composed of bits of sticks, moss, leaves, sand, or small stones, bound together with silk; and this is dragged about, or may be attached to some submerged object, preferably a stone at the bottom of rapidly running but shallow water. These cases are very diverse, from simple tubes to spirals very closely resembling snail-shells. Since they open behind, a current of water is allowed to pass through, and thus the respiratory filaments on the abdomen are aërated. The case-worm retains its hold in the tube by means of a pair of claws located at the apex of the abdomen. These larvæ are largely vegetable feeders, but will occasionally eat insects, and such species spin near the mouth of the tube a net of silk which is cup-shaped when drawn out by the water-current, and catches prey. The caddis-worms ('cad-bait' of anglers) live several months in this condition, and some regularly through the winter. "When ready to transform to pupa," says Howard, "both ends of the case or tube are protected by a silk netting spun by the larva, which transforms in security, well drawn back from either orifice. When ready to transform to the adult stage, the pupa works its way through the guarded orifice, swims to the surface of the water, and crawls out."

These insects have been but little studied in America; yet about one hundred and fifty species are known. They may be studied to advantage by placing the larvæ in a wire cage in their native stream, the cage extending above the water, so that the insect may emerge, but not escape. The most prominent family is Phryganeidæ, which contains the species of largest size. Consult McLachlan, *Monograph of the Trichoptera* (London, 1874-80), the authority for European forms. A list of species and key for genera, by N. Banks, may be found in *Transactions of the American Entomological Society* (Philadelphia, 1892); also a paper by Needham and Betten in the *New York State Museum Bulletin No. 47* (Albany, 1902).

CADDO, kăd'dô. An important Indian confederacy, from which the Caddoan stock derives its name, formerly holding the territory from the middle Red River in Louisiana westward nearly to the Brazos River in Texas. The name by which the tribes call themselves is Hasinai, whence the French *Asinais* and *Cenis*, Caddo being the abbreviated form of the name of their principal tribe. There are about a dozen sub-

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tribes, with ten gentes. Like most tribes of this stock, the Caddo were sedentary and agricultural, and were especially distinguished in early years for their friendly and hospitable character. They now number about 500, residing on allotments within their former reservation in western Oklahoma, which was opened to white settlement in 1901.

CAD'DOAN STOCK. An Indian linguistic group represented in the South by the Caddo and Wichita and associated tribes, and in the North by the Pawnee and Arikara (q.v.). Their original home seems to have been the lower Red River country of Louisiana and Arkansas, whence the Caddo and Wichita moved westward into Texas and the Indian Territory, while the Pawnee moved northwestward and settled upon the Lower Platte in Nebraska. The Arikara of North Dakota are a comparatively recent offshoot from the advance guard of the Pawnee. Like the Southern Indians generally, the Caddoan tribes were agricultural and more or less sedentary. In all their shifting they have retained these characteristics, preferring solidly built houses of earth-covered logs or grass thatch to the portable tepee, and depending more upon their gardens of corn and pumpkins than upon the buffalo-hunt. They have dwindled almost to disappearance, the entire stock numbering now only 1870 souls, although within living memory the Pawnee alone numbered 10,000.

CADE, Jack (? -1450). The leader of an insurrection beginning in Kent, England, June, 1450. He was of Irish birth, and had served in the French wars. Assuming the name of Mortimer, and claiming relationship with the Duke of York, Cade marched with 20,000 to 30,000 armed men on London, and encamped at Black Heath, whence he kept up a communication with the citizens, many of whom were in secret sympathy with the rising. The Court sent to inquire why the 'good men of Kent' had left their homes. Cade, in a paper entitled "The Complaint of the Commons of Kent," replied that the people were being robbed of their goods for the King's use; that mean and corrupt persons, who plundered and oppressed the commons, filled the high offices at Court; that it was "noised that the King's lands in France had been aliened"; that misgovernment had banished justice and prosperity from the land; that the men of Kent were especially ill-treated and overtaxed, and that the free election of knights of their shire had been hindered. In another paper, called "The Requests by the Captain of the Great Assembly in Kent," Cade demanded that the King should resume the grants of the Crown, which he complained the creatures about the royal person fattened on, while the King was compelled to live on taxation; that the false progeny of the Duke of Suffolk should be dismissed; and that the Duke of York and others should be restored to favor, and a number of persons punished. The Court sent its answer in the form of an army, before which Cade retreated to Seven Oaks, where he awaited the attack of a detachment, which he defeated. The royal army refused to fight against their countrymen; the Court made some concessions, and Cade entered London on July 3. For two days he maintained the strictest order; but he forced the Lord Mayor and the judges to pass judgment upon Lord Say, one of the King's most unpopular favorites, whose head Cade's men immediately cut off in Cheapside. On the third day some houses were plundered, the leader himself, it is said, setting the example. Cade, who at night lodged his army in the suburbs, received news that the citizens intended to prevent his entrance into the city on the next day, and in the night he made an attack on the bridge, but was defeated. The promise of pardon sowed dissension among his followers, who dispersed, and a price was set upon Cade's head. He attempted to reach the Sussex coast, but was slain near Lewes by Iden, the sheriff of Kent, on July 11.

CADELL', Francis (1822-79). A Scottish explorer, born at Cockenzie. In 1836 he entered the service of the East India Company as midshipman, and in 1844 was appointed to command a vessel. In 1848 an examination of the mouth of the Murray River, in Australia, convinced him of the navigability of that river, as to which he was further satisfied by an extended tour of exploration undertaken in 1850. He promoted the formation of a navigation company, the first of whose steamboats accomplished, in 1853, a voyage of 300 miles. Until 1859 he was busily concerned in explorations. In 1867, when sailing in command of a vessel from Amboyna to the Kei Islands, he was murdered by the crew.

CADENCE (Med. Lat. *cadentia*, from *cadere*, to fall). The 'fall' or close of a musical phrase or period. The term may apply to a melodic as well as an harmonic ending, and does not necessarily imply a 'fall' in pitch. In the most satisfactory final cadence, called Perfect, the melody passes upward to the final chord, so the term merely implies a subsiding from motion to rest, partial or complete. The word *cadence* is so inseparably associated with harmonic effects that we usually consider it in its specific sense, as the group of chords which form the harmonic turning-point or ending of every phrase, section, period, or complete movement. Cadences may be said to be the punctuation marks of the language of music. Some give the effect of finality —the full stop, or period. Others are merely pauses, like commas, and others, in their uncertain, questioning effect, are like interrogation marks. A final cadence, to give perfect satisfaction, must leave the tonality clearly defined by ending on the tonic chord; and its effect will be strengthened if the tonic tone is made especially prominent by appearing in the soprano as well as the bass. When the dominant or dominant seventh chord precedes the tonic, the cadence is called Authentic; where the subdominant chord precedes it, the cadence is Plagal. When, in either of these forms, the two chords are in fundamental position (*in chord*), and the soprano passes upward to the tonic, the cadence is Perfect. With any other movement of the voices, it is Imperfect.

The names Authentic and Plagal were used in early ecclesiastical music; and the latter cadence, called also the Amen cadence, is rarely used except in sacred music.

Directly opposed to the final character of the Authentic cadence is the *Half-Cadence*, called also the Half-Close, which ends on the dominant chord, preceded by the tonic. This gives the effect of an incomplete or partial close, and may be compared to a semicolon. When the chord of the dominant is followed by any other chord

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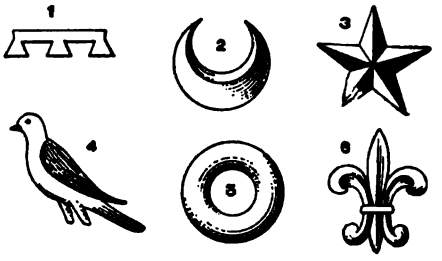
except the tonic, the effect is that of avoiding or postponing the conclusion; and the cadence is called, variously, Avoided, Deceptive, or Interrupted. This harmonic turning-point is simply a pause, like a comma, or in some cases like an interrogation point. Illustrations of the various cadences will be found in any text-book on harmony. Consult, also, Gow, *The Structure of Music* (New York, 1895).

CADENCY (Med. Lat. *cadentia*, from *cadere*, to fall). In heraldry, the marks by which the shields of the younger members of families are distinguished from those of the elder, and from each other. The study of such devices constitutes an extensive and important branch of the heraldic science. Nine marks of cadency are recognized in modern heraldry. The first son bears the label (fig. 1); the second, the crescent (fig. 2); the third, the mullet (fig. 3); the fourth, the martlet (fig. 4); the fifth, the annulet (fig. 5); the sixth, the fleur-de-lys (fig. 6); the seventh, the rose; the eighth, the cross-moline; the ninth, the octofoil. This system may be indefinitely continued, by charging label upon



label, etc., for the grandsons. No distinction is usually made by writers on heraldry, and probably the practice of heralds in general scarcely admits of any being made, between *marks of cadency, differences, distinctions*, or even *brisures*, though the last term is quite constantly and appropriately used, to include not only differences in general, but also abatements (q.v.) or bearings by which the arms of the family are broken or diminished. See BATON.

CADE'NUS. A name assumed by Jonathan Swift in a poem addressed to Miss Vanhomrigh, and entitled *Cadenus and Vanessa*, which the lady's executors published in Dublin, in 1726, but which had been written more than ten years before. The name is an anagram for the Latin word *decanus*, i.e. dean. See VANESSA.

CADEN'ZA, *It. pron.* kä-dän'tsä (It., descent, from Lat., It. *cadere*, to fall). In music, a brilliant passage of ornamental notes introduced toward the end of a musical composition and designed to give it a better rounding off. In instrumental pieces, it is usually based on themes of the work itself. In former times it was left to the performer to improvise his own cadenzas, but Beethoven was the first to compose them himself rather than rely on inapt performers. The practice of writing cadenzas is still kept up by famous players, as e.g. Ysaye in violin concertos, and Rosenthal and Sauer in piano-music.

CAD'ER ID'RIS (Welsh, chair of Idris, the giant). A picturesque mountain ridge in Merionethshire, Wales, five miles south-southwest of Dolgelly (Map: Wales, C 4). It is seven miles long, and one to three miles broad; the highest peak, Pen-y-Gader, reaches an elevation of 2925 feet. The view from the cairn at the summit extends across the Irish Sea, and as far as the Wrekin in Shropshire.

CADET, MILITARY (Fr., younger brother, Provençal *capdet*, from Med. Lat. *capitellum*, dim. of Lat. *caput*, head; so called to distinguish him from the elder brother, who was the real head of the family, after the father. The military meaning arose from the fact that the younger sons of the French nobility were generally provided for in the army). A student or an accepted candidate for a military commission. In the United States Army, cadets are educated at the Military Academy, West Point, N. Y. (q.v.), and the present method of their appointment has been in operation since 1843. The age for admission to the Military Academy is between 17 and 22 years of age, appointments, as a rule, being made one year in advance of the date of admission. Application is permissible at any time, by letter to the Secretary of War, to have the name of the applicant placed upon the file, from which it is furnished to the proper Representative or Delegate when a vacancy occurs. Application may also be made to the Congressman direct. Each Congressional district and Territory—also the District of Columbia—is entitled to have one cadet at the Academy. Each State is entitled to have two cadets from the State at large, and thirty are appointed from the United States at large. The appointment from a Congressional district is made upon the recommendation of the Congressman from that district, and those from a State at large upon the recommendations of the Senators of the State. Similarly, the appointment from a Territory is made upon the recommendation of the Delegate in Congress. Each person appointed must be an actual resident of the State, district, or Territory from which the appointment is made. The appointments from the District of Columbia and from the United States at large are made by the President of the United States upon his own selection. These latter appointments were originally designed for the benefit of sons of army officers, who, having no permanent abode, are thus debarred from securing an appointment in the usual way. The course of instruction covers a period of four years, and at its conclusion the cadets are commissioned second lieutenants in the United States Army. See MILITARY ACADEMY, UNITED STATES, for account of the education of cadets, and also for an historical sketch of the institution.

In England, cadets are trained at Woolwich (q.v.) and Sandhurst (q.v.), artillery and engineer cadets going to the former, and those destined for cavalry and infantry going to the latter. A similar system of appointment, preparation, and education of military cadets prevails among all European armies, further details of which may be found under MILITARY EDUCATION; ECOLE POLYTECHNIQUE; SANDHURST; STAFF COLLEGE.

CADET, NAVAL. The lowest grade of officers of the line, or executive branch, in the United States and other navies. In the United States Navy the title was *cadet-midshipman* until changed by act of Congress in 1882. In 1902 an act of Congress was passed and approved restoring the old title of *midshipman*. The cadets are under instruction at the Naval Academy, Annapolis, for four years, and then serve two

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years at sea in regular cruising ships, when they are commissioned as ensigns. The ages of entrance to the Academy are from 15 to 20 years, but efforts are being made to reduce the upper age limit to eighteen. According to the present law, the number of cadets allowed at the academy is one for each Representative and Delegate in Congress and appointed by them, and ten at large and one for the District of Columbia appointed by the President. See NAVAL ACADEMY, UNITED STATES.

The number of cadets in foreign navies is limited by the number of applicants or the requirements of the service. The examination of cadets for the British Navy takes place in London and Portsmouth in March, July, and November, and the limits of age are 14½ and 15½ years. The cadets are trained on board the old line-of-battle ship *Britannia*. In France the school for naval cadets is on board the stationary training-ship *Borda*, at Brest. The period of training is two years, and the age of entrance is from 14 to 18 years. In Germany the naval cadets are instructed at the Naval Academy at Kiel. The age of entrance must not exceed 19 years, and the requirements are such that very few boys under 16 are likely to pass the entrance examination.

CADI, *Arab. pron.* kä'dê, or **KADI** (Ar. *qādī*, judge, from *qaday*, to judge). The title of an inferior judge among the Mohammedan nations, who, like the Mollah (q.v.), or superior judge, was originally also a theologian, since all law is founded upon the Koran. The Cadi is differently appointed in different countries; in Turkey, where he is also called Naib, he is appointed by the Mufti or Sheikh ul-Islam, the head of the Mohammedan Church, and receives a fixed salary; in Persia and in Middle Asia the Cadi's office is more in the nature of a private affair.

CAD'ILLAC'. A city and county-seat of Wexford County, Mich., 98 miles north of Grand Rapids, on the Ann Arbor and the Grand Rapids and Indiana railroads (Map: Michigan, H 4). It is picturesquely situated on Little Clam Lake in a noted hard-wood timber region, and has extensive lumber interests. Settled in 1871, Cadillac was incorporated in 1874, and is now governed under a revised charter of 1895, which provides for a mayor elected annually, and a city council. Population, in 1890, 4461; in 1900, 5997.

CADILLAC, kä'dê'yäk', ANTOINE DE LA MOTHE (c.1660-1720). A French military officer, the founder of Detroit, Mich. He was born in Gascony, of a noble French family, spent some time in Acadia as a captain in the French Army, and in 1694 was appointed by Frontenac commander of Michilimackinac. Here he remained until 1697, when he laid before Louis XIV. his plan for a permanent settlement as a trading-post for the Northwest. With the King's approval he founded Detroit in 1701, with fifty settlers and fifty soldiers. He was Governor of Louisiana from 1712 to 1717, when he returned to France, where he died. Consult Parkman, *A Half Century of Conflict* (Boston, 1892).

CA'DIZ, *Sp. pron.* kä'dêth (Fr. *Cadix;* anciently, Lat. *Augusta Iulia Gaditana*, earlier *Gades*, Gk. Γάδειρα, *Gadeira*, from Phœnician *Gadir*, hedge, stockade, fort). A city of Spain, in Andalusia, capital of the province of its name and one of the most important seaports of the kingdom, situated on the Atlantic (Map: Spain, C 4). It is built on a narrow tongue of land projecting from the Isla de Leon. The harbor of Cadiz is spacious, strongly fortified, and divided into two parts, the large roadstead between Santa Catalina and Cadiz, and the smaller but safer harbor between the fortifications of Matagorda and Puntales. The town is surrounded by strong walls on the northwest and south, and by numerous fortresses which guard the entrances to the outer and inner harbors.

Cadiz presents a picturesque appearance, the whiteness of its buildings forming a striking contrast with the blue ocean. In its arrangement it is one of the most modern of Spanish cities, and although its limited site does not admit of wide avenues or extensive squares, its narrow streets are well paved and lighted, and scrupulously clean. The houses are invariably whitewashed, and in most cases surmounted by towers, or *miradores*, affording an excellent view of the sea. The main street is the Calle del Duque de Tetuan, and the chief squares are the Plaza de la Constitución, Plaza de Mina, and Plaza de la Catedral. Cadiz has a fine promenade, the Alameda de Apodaca, extending along the water on the north, and the extensive Parque Genoves with a summer theatre. The two cathedrals are of recent construction, and possess little architectural merit. In the southern part of the city is situated the old Capuchin convent, now used as an asylum, with the small church of Santa Catalina, containing Murillo's "Betrothal of Saint Catharine," a work which derives special interest from the fact that the master died while engaged in its execution. In the centre of the town is situated the Torre de Vigia, a watch-tower about 100 feet high, used as a signal station, and affording a magnificent ocean view. Cadiz, in spite of its maritime position, has a very hot and rather unhealthful climate, which, together with the inadequate water-supply, causes the high death-rate of about 44 per 1000. The city is the seat of a bishop and of a number of consular representatives. The educational institutions include a faculty of medicine affiliated with the University of Seville, schools of art and commerce, a theological seminary, and a number of minor schools. There are also a number of theatres and libraries, and an archæological museum. The Académia de Bellas Artes contains a fine gallery of Italian and Spanish paintings.

The commercial importance of Cadiz has been gradually declining, owing to the decreased communication with South America and the West Indies. The chief exports are sherry, olive oil, salt, and southern fruits. There is regular steam communication with Great Britain, the Canary Islands, the West Indies, France, South America, and Morocco. Population, in 1887, 62,531; in 1897, 70,177.

History.—Cadiz is one of the most ancient towns in Europe, having been built by the Phœnicians, under the name of Gaddir, about 350 years before the foundation of Rome, or about B.C. 1000. It afterwards passed into the hands of the Carthaginians, from whom it was captured by the Romans, who named it Gades, and under them it soon became a city of vast wealth and importance. It was occupied by the Goths from the

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dissolution of the Roman Empire to the battle of the Guadalete, when the Moors took possession of the southern peninsula. It was taken by the Christians in 1262. In 1587 Drake destroyed the Spanish ships of war at Cadiz. In 1596 the town was captured and sacked by the English under Howard and Essex. The French invested the place in 1810-12, but were compelled to raise the siege. In 1823 the Cortes retired to Cadiz and made a stand against the French army of invasion. In August the French stormed the Trocadero, and the struggle of the Constitutionalists was brought to a close.

CAD'IZ. A village and county-seat of Harrison County, Ohio, about 25 miles northwest of Wheeling, W. Va., on a branch road connecting with the Pittsburg, Cincinnati, Chicago and Saint Louis Railroad (Map: Ohio, H 5). It has important commercial interests in wool, and, though but a village, is noted as a banking centre, ranking among the leading municipalities of the State. Cadiz was the home of Edwin M. Stanton. Population, in 1890, 1716; in 1900, 1755.

CADME'A, or CADMEI'A. The name given to the acropolis of Thebes, Bœotia, because it was said to have been founded by Cadmus. The citadel was a low eminence and antedated the surrounding city. Only fragments of its walls remain.

CADME'ANS, or CADMEI'ANS. The name given to the inhabitants of Bœotian Thebes by the Greek dramatists.

CADMEAN VICTORY. A popular expression for a gain secured at great loss, and referring to the mutual slaughter of the warriors who sprang up from the dragon's teeth sown by Cadmus.

CAD'MIA (Lat., the ore of zinc, dross or slag formed in a furnace, from Gk. *καδμία, cadmia*, calamine). The term applied to the crust formed in zinc furnaces, which contains from 10 to 20 per cent. of cadmium.

CAD'MIUM (Neo-Lat., from Lat. *cadmia;* see CADMIA). A metallic element discovered in 1817 by Stromeyer. It is not found native, but occurs as the sulphide in the mineral greenockite, and in association with zinc ores. Greenockite is found in Bohemia and in Hungary; also in Lehigh County, Pa., but in too small quantities to be of commercial importance.

Cadmium is a constituent of most zinc ores, and as it is more volatile than zinc it passes over first, in the reduction of such ores, as cadmium oxide. This is collected, mixed with charcoal, and the mixture heated in iron tubes, from which the cadmium distills over in a more or less impure state. In order to purify it, the metal is redistilled and the product dissolved in hydrochloric acid, from which solution metallic cadmium is precipitated with zinc.

Cadmium (symbol, Cd; atomic weight, 112.38) is a bluish-white lustrous metal with a fibrous fracture, and capable of taking a high polish. Its specific gravity is 8.65. It melts at 320° C. (608° F.) and boils at 763° C. (1405.4° F.). It finds some use in the manufacture of alloys, as it generally increases the fusibility of metals without destroying their malleability. An amalgam of cadmium and tin is used in dentistry.

Cadmium forms a regular series of salts, of which the iodide, obtained by digesting one part of the metal with two parts of iodine in water and evaporating the solution, is used in medicine, and also for iodizing collodion. The most important compound of cadmium is the sulphide, which is precipitated from a solution of a cadmium salt by hydrogen sulphide. Cadmium sulphide is an orange or lemon-yellow powder that is of great permanency, and is used as a pigment under the name of *cadmium yellow*. It is also used for coloring toilet soaps, for the production of blue flames in pyrotechny, and in calico-printing.

CADMUS (Gk. *Κάδμος, Kadmos*). According to Apollodorus and the later mythographers, the son of Agenor, King of Phœnicia, and Telephassa, and brother of Europa. When the latter was carried off by Zeus, he and his brothers, as also their mother, were sent in quest of her, with injunctions from Agenor not to return without her. Their search was vain, and the oracle at Delphi told Cadmus to relinquish it, and to follow a cow which he should meet, and build a city where it should lie down. He found the cow in Phocis, followed her to Bœotia, and built there the city of Thebes, of which the acropolis was called Cadmea. At Thebes he killed a dragon, guardian of the well of Ares, and sowed its teeth, from which sprang armed men. These fought together till only five remained, who took service with Cadmus and became the ancestors of Theban families. Cadmus married Harmonia, daughter of Ares and Aphrodite, and later went to Illyria. He was considered the inventor of many useful arts, and to him was attributed the introduction of the Phœnician alphabet into Greece. This story, however, is unknown to the earlier Greek writers, and has been compiled out of many scattered and often inconsistent local legends. The Phœnician origin of Cadmus seems an invention of the Asiatic Greeks, and it is quite impossible to use the story as a basis for any historical narrative of Phœnician colonists in Bœotia. For a full collection of the material and bibliography, consult Crusius, s. v. "Kadmos," in Roscher, *Lexikon der Mythologie* (Leipzig, 1884).

CADO'GAN, GEORGE HENRY, Earl (1840—). A British statesman. He was born in Durham and studied at Christ Church College, Oxford. In 1873 he was returned as a member of Parliament for Bath, and in 1875 was appointed Parliamentary Secretary for War. From 1878 to 1880 he was Under-Secretary for the Colonies, and from 1886 to 1895 Lord Privy Seal. From 1895 to 1902 he served as Lord Lieutenant of Ireland. He took a prominent part in the discussion of the Irish Land Bill in 1887.

CADOL, kâ'dôl', VICTOR EDOUARD (1831-98). A French dramatist, born in Paris. He was at first in the Government service, but afterwards became a journalist, was a member of the *Temps* staff, and with About, Sarcey, and Gasperini founded *L'Esprit Français*. He published a long list of works, many written in collaboration. There may be mentioned *Les ambitions de M. Fauvel* (1867); *La fausse monnaie* (1869); *Le spectre de Patrick* (1872); *Thérèse Gervais* (1893); and *L'archduchesse* (1897). His dramatic works were collected in 1897 as *Théâtre inédit* (1897).

CAD'OOBER'GIA WOOD. See EBONY.

CADORNA, kâ-dôr'nâ, RAFFAELE (1815-97). An Italian general, born in Milan. During the Crimean War he commanded a battalion of in-

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fantry, and in 1854 served as a lieutenant-colonel on the general staff. In 1860 he was appointed Minister of War in the Provisional Government of Tuscany, and in 1866 military commandant of Sicily. He was sent in the latter year to Palermo and succeeded in crushing the remnants of the Bourbon insurrection. In 1870 he captured Rome, of which he was for a time military Governor. In 1871 he became a member of the Senate. He published *La liberazione di Roma nel 1870* (1889).

CADOUDAL, kȧ'dōō'dȧl', GEORGES (1771-1804). The leader in the Chouan insurrection during the French Revolution. He was born near Auray, in Lower Brittany, where his father was a miller, and was among the first to take up arms against the Republic, soon acquiring great influence over the peasants. Captured in 1794, he was sent as a prisoner to Brest, whence he soon made his escape. Annoyed at the dissensions between the Vendean generals and the emigrant officers, and the disasters consequent thereon, Cadoudal organized an army in which no noble was permitted to command, and which it taxed all the great military talents of Hoche to disperse. In 1797 Cadoudal was the soul of the conspiracy to overthrow the Directory and place a Bourbon on the throne; but the events of the 18th Fructidor frustrated the plan of the conspirators. He continued to carry on a guerrilla warfare in Lower Brittany long after the regular armies of the Vendée had surrendered. Bonaparte recognized Cadoudal's energy and force of character, and offered to make him a lieutenant-general in his army. Cadoudal refused. Fearing arrest, he fled to England, where, in 1802, he conspired with Pichegru for the destruction of the First Consul. With this design he went to Paris, but was arrested, condemned, and executed June 25, 1804. Cadoudal was a man of stern honesty and indomitable resolution. "His mind was cast in the true mold; in my hands he would have done great things," was Napoleon's estimate of him. Consult Georges de Cadoudal, *Georges Cadoudal et la Chouannerie* (Paris, 1887).

CADRE, kȧ'dr' (Fr., frame, from Lat. *quadrum*, square). The commissioned and non-commissioned staff officers, including the artificers and musicians, of a regiment. The term includes practically all the officers, non-commissioned officers, and men necessary in the construction of a framework or organization, around which may be assembled the rank and file required to constitute a regiment. It is peculiarly a French institution, and has particular application to the permanent regimental headquarters staff, round which a reserve regiment would assemble if mobilized.

CADUCEUS, kȧ-dū'sē-ŭs (Lat., from Gk. κηρύκειον, *kērykeion*, Æol. καρύκιον, *karykion*, herald's staff; for the interchange of D and R, cp. *ar-biter* for **ad-biter*). The winged staff of Mercury, or Hermes, as he was called by the Greeks. In its earliest form it is composed of three branches, one forming the handle, and the other two intertwined. This is also the herald's staff, as it appears in early works of art, and is borne also by Iris, as well as earthly messengers. Later, the place of the intertwined branches is taken by snakes, and in a still later form the staff is furnished with wings. Homer refers to the magic golden wand of Hermes, but without reference to its form. Among the moderns the caduceus is used as an emblem of commerce, over which Mercury was the presiding divinity.

CADWALADER, kȧd-wŏl'*a*-dĕr, GEORGE (1804-79). An American lawyer and soldier. He was born in Philadelphia, where he studied law and practiced that profession. He was a brigadier-general of volunteers in the Mexican War and for gallantry at Chapultepec was brevetted major-general. He again practiced law until the outbreak of the Civil War, became a major-general of volunteers in April, 1862, and in the same year was appointed a member of the commission to revise the military laws and regulations of the United States. He was the author of *Services in the Mexican Campaign of 1847* (1848).

CADWALADER, GEORGE, GENT. An assumed name of George B. Dodington.

CADWALADER, or **CADWALLADER,** JOHN (1742-86). An American soldier. He was born in Philadelphia, where he served as a member of the Committee of Safety, and at the beginning of the Revolutionary War was made commander of the Pennsylvania militia, with the rank of brigadier-general. He participated in the battles of the Brandywine, Germantown, Monmouth, and Trenton, and in July, 1778, fought a duel with Gen. Thomas Conway, the leader of the cabal against Washington. (See CONWAY CABAL.) Subsequently General Cadwalader was a member of the Maryland Legislative Assembly.

CADWALLADER. In Foote's farce, *The Author*, a character burlesquing a certain Mr. Aprice, his friend, who later secured the play's withdrawal.

CADWALLADER, REV. MR. The easy-tempered village parson in George Eliot's *Middlemarch*.

CADWALLON, kȧd-wŏl'lon. A harper in Scott's *The Bethrothed*, who is killed for disguising himself as Vidal.

CÆCILIIDÆ, sĕs'ĭ-lĭ'ĭ-dē (Neo-Lat., from Lat. *Cæcilia*, a kind of lizard, from cæcus, blind). A family of degenerate, worm-like, burrowing amphibians of the tropics. See BLINDWORM, 3.

CÆCIL'IA GENS. A plebeian clan of Rome of which mention is found in the Fifth Century B.C. Its family names are Bassus, Denter, Metellus, Niger, Pinna, and Rufus.

CÆCILIA METEL'LA, TOMB OF. The most conspicuous ruin on the Appian Way, near Rome, the magnificent burial-place of the daughter of Metellus Creticus and daughter-in-law of the triumvir Crassus. The tomb formerly known as Capo de Bove, from its frieze of ox-skulls, is a circular edifice measuring 65 feet in diameter, standing on a square base. The whole was sheathed with travertine, which was removed under Pope Sixtus V. for use in other buildings. The tomb was converted into a battlemented stronghold in the Thirteenth Century. The secret passage to the crypt was accidentally found by workmen who were dismantling the base in the Sixteenth Century. The sarcophagus is still preserved.

CÆCILIUS STATIUS, sē-sĭl'ĭ-ŭs stā'shĭ-ŭs (B.C. ? -168). A Roman comic poet and dramatist, of whose works few fragments remain. The people ranked him with Plautus and Ter-

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ence. Consult Ribbeck, *Comicorum Romanorum Fragmenta* (Leipzig, 1873).

CÆ'COMOR'PHÆ (Neo-Lat., from Lat. *cæcus*, blind + Gk. *μορφή*, *morphē*, shape, form). An order of birds agreeing in cranial structure (schizognathous and schizorhinal), externally characterized by having palmate feet, and embracing the loons, grebes, sea-fowl, gulls, albatrosses, petrels, and allied forms.

CÆCUM, sē'kŭm (Lat. *cæcus*, blind). A blind pouch in the human intestine into which the small intestine empties. It is also called the *caput coli*, or head of the colon. The colon, or large intestine, starts from it, in the hollow of the right iliac region, and runs upward, in its first part. The cæcum in man is too small to serve as an important part of the digestive tract, and is comparatively useless. From it springs the vermiform appendix (q.v.), generally posteriorly, the lumen of the appendix opening into the cavity of the cæcum. The microscopic structure of the walls of the cæcum does not differ in any essential from that of the rest of the large intestines. (See INTESTINES.) There are four coats, the mucous, the sub-mucous, the muscular, and the serous. The mucous coat consists of a lining of simple cylindrical epithelium, which is continuous with the epithelium of simple tubular glands, which lie side by side, and are supported by a loose lymphoid connective-tissue stroma. Beneath this is a single or double layer of muscle, the *muscularis mucosæ*. Beneath this is a vascular connective-tissue layer, the *sub-mucosa*, which often contains lymph nodules. Passing outward from the sub-mucosa, the next coat is the muscular, divided into an inner layer, whose cells are disposed circularly to the lumen, and an outer layer, whose cells have their long axes directed longitudinally. In the cæcum and large intestine the circular layer is usually thinner than in other parts of the gastro-intestinal canal, and the outer layer is incomplete, being arranged in three longitudinal bands, which are shorter than the other coats of the intestines and give it a sacculated appearance. The serous coat is a thin connective-tissue layer covered over with a single layer of flat endothelial cells.

CÆCUM IN ANIMALS. In many of the mammalia, and particularly in most of those which are herbivorous, the cæcum is comparatively large, and is found to secrete an acid fluid resembling the gastric juice. It therefore appears that, where the nature of the assimilatory process is such as to require the detention of the food for a considerable time, this provision is made for it in order that digestion may be more completely accomplished. The cæcum is entirely wanting in some quadrupeds, as in bats, and the bear and weasel families. Birds have two cæca, which are generally long and capacious in those that are omnivorous or granivorous, and the position of which is the only circumstance that marks the division of the intestine into two parts, the small and the large intestine, or the *ileum* and the *colon*. The first traces of the true cæcum are found in reptiles, where it is mostly of small size. Fishes have no true cæcum occurring in the position occupied by those of quadrupeds and birds, but many of them have fluid sacs attached to the intestine at its uppermost part, known as pyloric cæca, and serving to increase the digestive surface. The number of these cæca, however, is extremely various; sometimes there is only 1, and sometimes nearly 200. The number is different even in very nearly allied species of the same family; thus, there are only 6 in the smelt, but 70 in the salmon, 24 in the herring, and 80 in the shad. In some fishes, as in the cod, the cæcum consists of large trunks ramified into smaller ones.

CÆDMON, kăd'mon. An English poet of the second half of the Seventh Century. The only information of any weight concerning him is in Bede's *Ecclesiastical History* (iv. 24), which was completed in 731. According to Bede, Cædmon was a man of 'secular habit,' living in the monastery at Whitby, in old Northumbria. One night while sleeping in the stables, he saw a vision, whence came a voice commanding him to sing the origin of created things. Cædmon immediately began to sing of God the Creator. After relating the story of the poet's inspiration, with many details, Bede says: "Thus sang he of the creation of the world, and the beginning of the race of men, and all the history of Genesis; of the exodus of Israel from Egypt, and the entrance into the promised land; of many other stories of the Holy Scriptures; of the incarnation of the Lord, His passion, resurrection, and ascension; of the coming of the Holy Ghost, and the teachings of the Apostles; also of the terrors of the future judgment and the horror of hell-punishment, and the sweetness of the heavenly kingdom." There is now in the Bodleian Library, Oxford, a MS. (West Saxon, Tenth Century) of sacred epics, of which the poems known as Genesis, Exodus, Daniel, Christ, and Satan, correspond with the substance of Cædmon's *Paraphrase*, as described by Bede. They have been ascribed as a whole, or in part, to Cædmon. The best criticism, however, holds that some of them, and perhaps none, are his; that they belong, rather, to a class of popular religious poems, which may be called, if one likes, Cædmonian. The theme of these poems anticipates that of Milton's great epics; and attempts have been made to connect Milton directly with the Cædmon *Paraphrase*. Other poems besides those mentioned have been credited to Cædmon. Of great philological interest—for it is written in the Northumbrian dialect—is the hymn which Cædmon is supposed to have composed in his dream. These verses are preserved in a MS. of Bede's *History*, now at Cambridge. For text of the Cædmon poems, consult: Grein-Wülker, *Bibliothek der angelsächsischen Poesie*, Vol. II. (Leipzig, 1894); for a translation, Thorpe, *Cædmon* (London, 1832); for account of Cædmon and the poems, ten Brink, *Early English Literature*, translated (London, 1883); and Morley, *English Writers*, Vol. II. (London, 1888).

CÆ'LIA GENS. A plebeian clan of Rome with the family names Caldus and Rufus. The gens name is generally written Coelius on coins.

CÆ'LIAN. One of the seven hills of Rome. See ROME.

CÆ'LIMONTA'NA. The smallest of the regions of Augustus in Rome. It included the Cælian Hill and contained the Temple of Claudius, the palace of Commodus, and the great market of Nero.

CÆ'LIUS, MARCUS RUFUS. A Roman noble of the First Century B.C. He had considerable talent as a writer and orator, but was conspicuous for his profligacy. In B.C. 56 Clodius's sister,

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Clodia Quadrantaria, whom he had deserted, accused him of having made an attempt to poison her, and of having borrowed money from her in order to procure the murder of Dion, the Alexandrian ambassador. Cicero defended him in an oration which is still extant (Cicero, *Pro Cælio*). On the outbreak of the Civil War in 49, he supported Cæsar, who rewarded him by appointing him to the prætorship in B.C. 48. Soon afterwards his own enormous debts led him to bring forward a law for the abolition of debts, whereupon he was deprived of his office. He was killed at Thurii while attempting to raise an insurrection in favor of Pompey. Cælius was a friend of Catullus, who addressed two of his poems to him (*Carmina*, LVIII. and C).

CÆLIUS AURELIA'NUS. A Latin medical writer in the Fifth Century A.D., a resident of Sicca in Africa. He translated from the Greek an important work on acute and chronic diseases, which is still extant. He was an exponent of the 'methodic' school of medicine.

CAEN, kän (anciently, Lat. *Cadomum*). The capital of the Department of Calvados, France, formerly the capital of Lower Normandy, situated on the left bank of the Orne, about 9 miles from its mouth and 149 miles west-northwest of Paris (Map: France, F 2). Caen is built in the middle of a fertile plain; its streets are wide and clean; it has several fine squares, and many noble specimens of ancient Norman architecture. Among the best examples are the churches of Saint Etienne, founded by William the Conqueror, and which contained his monument, erected by William Rufus, and destroyed by the Huguenots in 1562; La Trinité, called also Abbaye aux Dames, founded by Matilda, wife of the Conqueror; Saint Nicholas, now a cavalry fodder store; Saint Pierre; and Saint Jean. The castle, founded by the Conqueror, and finished by Henry I. of England, was partially destroyed in 1793. There are a university with 60 professors and 600 students, a museum with a splendid art collection, a public library with over 100,000 volumes, and many other educational and industrial institutions. The city has manufactures of lace, blonde, crape, cutlery, cotton-yarn; breweries, dye-works, wax-bleaching, and ship-building yards. Its Angora gloves, made from the unwashed, undyed fur of Angora rabbits, which are reared in the district, are celebrated. Quarries in the neighborhood produce Caen stone. Trade is facilitated by a maritime canal connecting the port with the sea, and also by ample railway connections. Population, 1896, 45,380. Consult Delarue, *Histoire de Caen* (Paris, 1842).

CAEN (kā'ĕn *or*, *Fr. pron.*, kän) **STONE.** A soft, light-colored limestone well adapted for plain and carved ornamental work, obtained near Caen, in Normandy. The quarries have been celebrated since a very early period. The excellence of the stone and the facility of transport by sea led to the very extensive use of Caen stone in England in the Fifteenth and Sixteenth centuries. In 1460 the Abbot of Westminster obtained a license to import Caen stone for the repairs of the monastery. Later it became a regular article of importation, and in 1582 it was rated at the custom-house at 6s. 8d. the ton. Winchester and Canterbury cathedrals, Henry VII.'s chapel at Westminster, and many churches are built of Caen stone, which is still frequently used in England. The quarries are subterraneous, and the stone, in blocks of 8 or 9 feet long and about 2 feet thick, is brought to the surface through vertical shafts. Owing to its porous and soft nature, the stone is unfitted for exterior work in a severe climate like that of the United States. See LIMESTONE.

CÆRE, sē'rē. See CERVETRE.

CAERLEON, kär-lē'on (Welsh, *caer*, fortress, castle, town + *leon*, legion). An ancient town in Monmouthshire, England, on the Usk, two miles northeast of Newport (Map: England, D 5). It is the Isca Silurum of the Romans, and is supposed to have been the capital of the Roman Province of Britannia Secunda, now Wales, and the residence of the famous King Arthur. It was the seat of an ancient archbishopric, which was removed to Saint Davids in the Eleventh Century. Many Roman remains have been discovered in the neighborhood, and a great number of the smaller antiquities have been gathered into a very fine collection in the town museum. Near by is a large amphitheatre; also an artificial mound which has been given the name of King Arthur's Round Table. Population, in 1891, 1411; in 1901, 1367.

CAERNARVON, kär-när'von. See CARNARVON.

CÆRULA'RIUS, MICHAEL. The Patriarch of Constantinople from 1043 to 1059, who completed the breach prepared by Photius between the Latin and Greek churches. He did away with the use of the Latin ritual in many Bulgarian churches, and in a letter to the Bishop of Trani, Apulia, made formal attack upon Rome. His complaints were bitter restatements of those long previously made, including particularly the use by the Latins of unleavened bread in the sacrament of the Lord's Supper. In consequence of this letter, Pope Leo IX. sent to Constantinople ambassadors who were kindly received by the Emperor Constantine Monomachus, but resisted by Michael, who later succeeded in influencing the Emperor's attitude. Thereupon the Papal legates deposited on the altar of the Church of Saint Sophia a bull of excommunication, and departed. Michael continued in power until banished by the Emperor Isaac Comnenus in 1059. There are extant some decretals of Michael, and Henricus Canisius gives several letters in his *Antiquæ Lectiones*. Consult Pichler, *Geschichte der kirchlichen Trennung zwischen dem Orient und Occident* (Munich, 1864).

CÆS'ALPIN'IA (after the Italian botanist Cæsalpinus). A genus of trees of the order Leguminosæ, the type of the sub-order Cæsalpiniæ. This sub-order is characterized by irregular flowers, which are not papilionaceous, and contains more than 700 known species. Among the members of the groups many are notable for their purgative properties, as senna (q.v.); some produce eatable fruits, as the tamarind (q.v.), the carob (q.v.), and the West Indian locust-tree (q.v.); some yield resinous and balsamic products, as copaiva (q.v.) and aloes-wood; some produce important dye-woods, as logwood (q.v.); brazilwood (q.v.), and camwood (q.v.); and some are trees of great size, and very valuable for their timber, as the purplewood (q.v.) and the wallaba trees of Guiana. No species of the sub-order is British, and it generally be-

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longs to warm climates. The genus Cæsalpinia contains about fifty species of trees and shrubs with pinnate or bipinnate leaves, handsome purple or yellow flowers in racemes, natives of the warm parts of Asia and America, which yield the brazilwood, Pernambuco-wood, and sapanwood (q.v.) of commerce, also the astringent pods called dividivi (q.v.), used in tanning. Some of the species are highly ornamental, as the royal poinciana (*Cæsalpinia regia* or *Poinciana regia*) and the dwarf poinciana (*Cæsalpinia pulcherrima*.

CÆSALPINUS, sēs'ăl-pī'nŭs. See CESALPINO.

CÆ'SAR. The cognomen of the most renowned branch of the patrician *Gens Julia*, which claimed descent from the mythical Iulus, son of Æneas. The earliest mentioned in history is Sextus Julius Cæsar, who held the office of prætor in B.C. 208. The great Cæsar (see below) left no direct male descendant to bear his name, but by his adoption of Octavius (afterwards the Emperor Augustus) the name passed to him, and from Augustus, also by adoption, to his immediate successors Tiberius and Caligula. Claudius and Nero, though not Julii, continued the name, which died out as a family name when Nero was killed. Henceforth it became a title of the reigning emperor; Vitellius alone refused to accept it. From Trajan's reign it stands regularly after the name 'emperor'; *imperator Cæsar*. Later the title *Cæsar* was used to designate especially the heir presumptive to the throne, though it did not cease to be part of the imperial title. From it are derived the titles of the Russian Czar and the German Kaiser.

CÆSAR, DON. In Mrs. Cowley's *Bold Stroke for a Husband*, Olivia's father, an old man who makes loves to a young girl, in order to lead his daughter to marry.

CÆSAR, GAIUS JULIUS (B.C.100-B.C.44). A famous Roman general, statesman, and writer; one of the most remarkable men of all time. He was the son of a Roman prætor of the same name, and was born July 12, B.C. 100. Two circumstances conspired to determine his sympathies in favor of democracy, and against a republican oligarchy. The first was the marriage of his aunt Julia with Gaius Marius; the second, the marriage of Cæsar himself, in B.C. 83, with Cornelia, daughter of L. Cinna, one of the principal enemies of Sulla. The anger of the dictator at this cost Cæsar his rank, property, and almost his life itself. Feeling that he would be safer abroad for a time, he went to Asia (B.C. 81); but on learning of the death of Sulla (B.C. 78), he hurried back to Rome, where he found the popular party in a state of great ferment, and anxious to regain what it had lost under the vigorous despotism of the aristocratic dictator. Cæsar, however, took no part in the attempts of Lepidus to overthrow the oligarchy; but he showed his political leanings by prosecuting (B.C. 77) Cn. Dolabella—a great partisan of Sulla—for extortion in his Province of Macedonia. To improve his eloquence, he went to Rhodes to study under the rhetor Apollonius Molo. In B.C. 74 he returned to Rome, where he had been elected pontifex, and now for the first time threw himself earnestly into public life. In the year B.C. 70 he attached himself to Pompeius, whose political actions at this time were of a decidedly democratic character. In B.C. 68 Cæsar obtained a questorship in Spain. On his return to Rome (B.C. 67) he married Pompeia, a relative of Pompeius, with whom he was daily becoming more intimate. In B.C. 65 he was elected to the curule ædileship, and lavished vast sums of money on games and public buildings, by which he increased his already great popularity. For the next few years Cæsar is found steadily skirmishing on the popular side. In B.C. 63 he was elected Pontifex Maximus, and shortly after prætor. During the same year occurred the famous debate on the Catiline conspiracy, in which the aristocratic party vainly endeavored to persuade the consul, Cicero, to include Cæsar in the list of conspirators. In B.C. 62 Pompeius returned from the East, and disbanded his army. Next year Cæsar obtained, as proprætor, the Province of Hispania Ulterior. His career in Spain was brilliant and decisive. On his return he was elected consul, along with M. Calpurnius Bibulus (B.C. 60). Cæsar, with rare tact and sagacity, reconciled the two most powerful men in Rome, who were then at variance—Pompeius and Crassus—and formed an alliance with them, known in history as the *First Triumvirate* (B.C. 60). Both of these distinguished men aided Cæsar in carrying his Agrarian Law (B.C. 59); and to strengthen still further the union which had been formed, Cæsar gave Pompeius his daughter, Julia, in marriage, though she had been promised to M. Brutus; while he himself married Calpurnia, daughter of L. Piso, his successor in the consulship. On the expiration of his term of office, he obtained for himself, by the popular vote, the Province of Gallia Cisalpina and Illyricum for five years, to which the Senate added—to prevent the popular assembly from doing so—the Province of Gallia Transalpina. Nothing could have been more favorable to Cæsar's aims. He had now an opportunity of developing his extraordinary military genius, and of gathering round him an army of veterans, whom perpetual victory should inspire with thorough soldierly fidelity and devotion to his person. This was the very thing he wanted to give him a reputation equal to that of his coadjutors, Pompeius and Crassus, whom, in genius, he far surpassed. Leaving, therefore, the political factions at Rome to exhaust themselves in petty strifes, Cæsar, in B.C. 58, after the banishment of Cicero, repaired to his provinces, and during the next nine years conducted those splendid campaigns in Gaul by which, had he done nothing else, he would have "built himself an everlasting name." Cæsar's first campaign was against the Helvetii, who were migrating from Switzerland into Gaul, and whom he totally defeated near Bibracte (Mont-Beuvray, near Autun). Out of 368,000 men, women, and children, only 110,000 remained. These were commanded by Cæsar to return home and cultivate their lands. The eyes of the Gauls were now turned upon the new conqueror, whose aid was solicited against an invader from beyond the Rhine, the German chief Ariovistus. Cæsar advanced against Ariovistus, who was utterly overthrown. And now Cæsar, having in the course of one campaign successfully concluded two important wars, led his troops into winter quarters.

Next year (B.C. 57) occurred the Belgic War, in which Cæsar successively routed the Suessiones,

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Bellovaci, Ambiani, and Nervii, who, alarmed at the progress of the Roman arms, had entered into an alliance with each other against the invaders. When the Senate received Cæsar's official dispatches, it decreed a thanksgiving of fifteen days—an honor never previously granted to any other general. During the winter and the spring following, Cæsar stayed at Lucca; and, after spending large sums of money in hospitality and for other less praiseworthy purposes, he departed for Gaul, where the flames of war had burst out in the northwest. The Veneti, a maritime people of Brittany, who possessed fleets of large vessels, were the chief instigators of the insurrection. Cæsar's plans were laid with consummate skill, and were crowned with the most splendid success. The Veneti were totally defeated, and most of the other Gallic tribes were either checked or subdued. Cæsar wintered in the country of the Aulerci and Lexovii (Normandy), having, in the course of three campaigns, conquered Gaul. Next year (B.C. 55) Crassus went to the East (where he was slain by the Parthians in B.C. 53), and Pompeius to Spain, while Cæsar's provincial government was prolonged for five years. He now undertook a fourth campaign against two German tribes who were about to enter Gaul. He was again successful; and, pursuing the fleeing enemy across the Rhine, which he had bridged, spent eighteen days in plundering the district inhabited by the Sigambri. He next invaded Britain, about the autumn; but after a brief stay in the island returned to Gaul. The Roman Senate, astonished at his hardihood and his successes in regions where no Roman army had ever been before, accorded him a public thanksgiving of twenty days. In B.C. 54 Cæsar opened his fifth campaign by a second invasion of Britain. On his return to Gaul, he was compelled—on account of the scarcity of corn, arising from drought—to winter his army in divisions. This naturally aroused the hopes of the Gauls, who thought the time had come for recovering their independence. An insurrection broke out in the northeast of Gaul, which was at first partially successful, but was ultimately crushed. Cæsar resolved to winter at Samarobriva (Amiens), in the vicinity of the malcontents. In B.C. 53 he commenced his sixth campaign. It was chiefly occupied in crushing a second insurrection of the Gauls.

Cæsar then returned to northern Italy, that he might be able to communicate more easily and securely with his friends in Rome. That city was gradually becoming more anarchic, the evils of weak government more apparent; the hour for decisive action seemed to be approaching, and doubtless Cæsar's heart beat with expectation of the mighty future reserved for his boundless ambition, when all at once the prospect was darkened by a tremendous rebellion extending over the whole of Gaul, headed by a young warrior named Vercingetorix. It was in the dead of winter when the news came to Cæsar, who instantly saw that, at all hazards, he must preserve his fame and his army. Leaving, therefore, his rival Pompeius to succeed at Rome, he hurried to meet the insurgent hordes. His great difficulty was to collect his scattered legions. First crossing, with some Cisalpine and provincial troops, the mountains of Auvergne, though they lay six feet deep in snow, he suddenly appeared among the Arverni, who, terrified at his unexpected approach, sent for their chief, Vercingetorix, to come to their assistance. This was precisely what Cæsar wished. After some wonderful exhibitions of military skill and numerous successes by the Romans, Vercingetorix was shut up in Alesia (Alise in Burgundy), with all his infantry. Cæsar besieged him, and though harassed by nearly 300,000 Gauls without, who attempted, but in vain, to break through the well-defended Roman lines, he forced Vercingetorix to capitulate. Many of the tribes now hastened to submit to Cæsar, who prudently determined to winter among the vanquished. The Senate voted him another public thanksgiving. In the next year (B.C. 51) Cæsar proceeded to quell the tribes who still held out. This he successfully accomplished, and having, in addition, reduced the whole of Aquitania, passed the winter of his eighth campaign at Nemetocenna, in Belgium, where he spent the time in a manner both politic and magnanimous. The Gallic princes were courteously and generously treated; the common people were spared the imposition of further taxes; and everything was done to render it possible for him to visit Italy with safety in the spring. This he did, and took up his residence at Ravenna, where he was informed of everything that was going on by the tribune C. Curio. There can be no doubt that at this moment he was the most popular man in the State, while his soldiery were devoted to him with a loyalty as enthusiastic as that which Bonaparte inspired when fresh from his Italian victories.

Meanwhile, Pompeius, whose vanity could not endure the greatness of Cæsar, had been gradually inclining again to the aristocracy, whose dread of the new conqueror was hourly increasing. After much futile diplomatic *finesse* on all sides, the Senate carried a motion "that Cæsar should disband his army by a certain day; and that if he did not do so he should be regarded as an enemy of the State." The tribunes Marcus Antonius and Q. Cassius put their veto on this motion; but they were violently driven out of the Senate chamber, and, fearing for their lives, they fled to Cæsar's camp. The Senate, in the madness of their terror, now declared war, and intrusted the conduct of it to Pompeius, whose pride in the invincibility of his military prowess hindered him from taking the necessary measures for the defense of the State. He fancied that his name would bring thousands to his standard, and he was even led to believe that Cæsar's troops were willing to desert their general; the result of which delusion was that when hostilities formally commenced, he had hardly any soldiers except two legions which had recently been in the service of his rival. Cæsar, on the other hand, perceiving that the time for decisive action had at length come, harangued his victorious troops, who were willing to follow him anywhere; crossed the Rubicon (a small stream which separated his province from Italy proper), and moved swiftly, amid the acclamations of the people, toward Rome. Pompeius fled to Brundisium, pursued by Cæsar, but contrived to reach Greece in safety, March 17, B.C. 49. The Italian cities had everywhere gladly opened their gates to the conqueror as a deliverer. Within three months Cæsar was master of all Italy.

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CAIUS JULIUS CÆSAR
FROM THE BRONZE BUST IN THE BERLIN MUSEUM

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UNIV. OF MICH.

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Cæsar next subdued Pompeius's legates in Spain, who were at the head of considerable forces. On his return he took Massilia (Marseilles), where he learned that he had been appointed dictator of the Republic — a function which at this time he retained for only eleven days; but these were honorably distinguished by the passing of several humane enactments. Pompeius, now thoroughly alive to the magnitude of his danger, had gathered a powerful army in Egypt, Greece, and the East, while his fleet swept the sea. Cæsar, however, crossing the Adriatic at an unexpected season, hastened to Dyrrhachium, where Pompeius's stores were; but was nevertheless outstripped by his opponent. Pompeius intrenched his army upon some high ground near the city, where he was besieged by Cæsar. The first encounter was favorable to Pompeius, who drove back Cæsar s legions with much loss. The latter now retreated to Thessaly, followed by his exulting enemies. A second battle ensued on the plains of Pharsalia, August 9, B.C. 48. Pompeius's army was utterly routed and Pompeius himself fled to Egypt, where he was treacherously murdered. See POMPEIUS.

No sooner had the news reached Rome than Cæsar was again appointed dictator for one year, and consul for five years. He was invested with tribunitial power for life, and with the right of holding all the magisterial comitia except those for the election of the plebeian tribunes. He did not, however, return to Rome after the battle of Pharsalia, but went to Egypt, then in a distracted condition on account of the disputes regarding the succession. Out of love for Cleopatra (who subsequently bore him a son), he entered upon the 'Alexandrine War,' in which he was successful, and which he brought to a close in March, B.C. 47. He next overthrew Pharnaces, King of Bosporus, son of Mithridates, near Zela, in Pontus, August 2d of the same year, and arrived in Rome in September. He was once more appointed dictator, and the property of Pompeius was confiscated and sold. Before the close of the year he had set out for Africa, where his campaign against the Pompeian generals, Scipio and Cato, was crowned with victory at the battle of Thapsus, April 6, B.C. 46. Cato committed suicide at Utica; and with such irresistible celerity was the work of subjugation carried on, that by the end of the summer Cæsar was again in Rome. Now occurred that display of noble and wise generosity which proves Cæsar to have been possessed of a great, magnanimous nature. He was not a man that could stoop to the vulgar atrocities of Marius or Sulla, and so he majestically declared that henceforth he had no enemies, and that he would make no difference between Pompeians and Cæsarians. His victories in Gaul, Egypt, Pontus, and Africa were celebrated by four great triumphs, during which the whole Roman populace was feasted and fêted by the magnificent liberality of the dictator.

He now proceeded to check, by wholesale enactments, as far as in him lay, the social evils which had long flourished in the city. During the year B.C. 46, also, he conferred a benefit on Rome and on the world by the reformation of the calendar, which had been greatly abused by the Pontifical College for political purposes.

In the meanwhile Pompeius's sons, Gneius and Sextus, were in arms in Spain. Cæsar overwhelmed their forces at Munda (B.C. 45). He now received the title of 'Father of his Country,' and also of *imperator;* was made dictator and *præfectus morum* for life, and consul for ten years; his person was declared sacred, and even divine; he obtained a bodyguard of knights and senators; his statue was placed in the temples; his portrait was struck on coins; the month Quintilis was called Julius in his honor; and on all public occasions he was permitted to wear the triumphal robe. He now proposed to make a digest of the whole Roman law for public use; to found libraries for the same purpose; to drain the Pontine marshes; to enlarge the harbor of Ostia; to dig a canal through the Isthmus of Corinth; and to quell the inroads of the barbarians on the eastern frontiers. But in the midst of these vast designs he was cut off by assassination, on the Ides (15th) of March, B.C. 44. The details of this crime—the greatest disaster that could have befallen the Roman world, as subsequent events made plain—are too familiar to require narration. It is sufficient to say that of the sixty aristocrats who were in the conspiracy, many had partaken of Cæsar's generosity, and all of his clemency. A few, like Brutus, out of a weak and formal conscientiousness, based on theory rather than insight, were probably shocked by Cæsar's desire to change the form of government into an hereditary monarchy; but most of them, like Cassius, were inspired by a jealous hatred of the dictator, and the base ambition of regaining power at all hazards.

Cæsar, who was 56 years of age when he was murdered, was of a noble and kingly presence, tall of stature, and possessing a countenance which, though pale and thin with thought, was always animated by the light of his black eyes. He was bald-headed (at least, in the latter part of his life), wore no beard; and though of a rather delicate constitution naturally, he ultimately attained to the most vigorous health. His besetting sin was sensuality; but without meaning to detract from the criminality of his conduct in this respect, it may be said that it was as much the sin of the times in which he lived as his own, and that the superlative grandeur of his position gave a prominence to his licentiousness which a more humble lot would have escaped. His intellect was marvelously versatile. In everything he excelled. He was not only the first general and statesman of his age, but he was—excepting Cicero—its greatest orator. As an historian he has never been surpassed, and rarely equaled in simplicity and vigor of style, and in the truthfulness with which he narrates events of which he was an eye-witness. He was, moreover, a mathematician, philologist, jurist, and architect, and always took great pleasure in literary society. Most of his writings have been lost, though their titles are preserved; yet we still possess his invaluable *Commentarii* (generally known as "Cæsar's Commentaries on the Gallic and Civil Wars"). The *editio princeps* was printed at Rome (1449). The best edition of his works is that of Dinter (Leipzig, 1890). Cæsar's life was formally written in ancient times by Suetonius and Plutarch. Consult, also: Delorme, *César et ses Contemporains*, etc. (Paris, 1868); Napoleon III., *Histoire de Jules*

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César (Paris, 1865-66); Stoffel, id., *La Guerre civile* (Paris, 1888); Froude, *Cæsar* (London, 1879); Dodge, "Cæsar," in *Great Captains Series* (Boston, 1892); and Fowler, *Julius Cæsar and the Foundation of the Roman Imperial System* (New York, 1892). On the Gallic campaigns, consult Holmes, *Cæsar's Conquest of Gaul* (London, 1899).

CÆSAR, GARDENS OF. A tract on the southern slope of the Janiculum at Rome, laid out by Julius Cæsar in terraces supported by colonnades, with artificial glens and waterfalls. The site commanded an extended view. No remains above ground are now extant, but the spot has yielded a number of important works of art. The gardens were given to the people by Cæsar's will.

CÆS'ARE'A IN CAPPADOCIA, kăp'pă-dō'shi-ȧ. See KAISARIEH.

CÆS'ARE'A (Gk. Καισάρεια, *Kaisareia*) **PAL'ESTI'NÆ.** An ancient seacoast town of Palestine, on the site of which is the modern El-Kaisariyeh, 32 miles north of Jaffa (Map: Palestine, A 2). It was built by Herod the Great and named in honor of Augustus Cæsar. The site was originally called Strato's Tower. Herod made here a magnificent harbor by constructing a strong breakwater (the ruins of which still remain) on which he lavished vast sums of money. The town was built at great expense, with an amphitheatre, temples, and other like structures (Josephus, Ant. xv. 3-5; 9-6; xvi. 5-1). Its water-supply and drainage system were of unusual excellence. It became the military capital of Palestine, where the Roman procurators had their headquarters. It is noted in New Testament history as the place where Peter preached the Gospel to Cornelius, the first Gentile convert to Christianity (Acts x.), and as the scene of Paul's two years' imprisonment (Acts xxiii. 33, xxvi. 32). In the great war with Rome, A.D. 66-70, Cæsarea suffered the almost total extermination of its Jewish inhabitants. Here Vespasian had his headquarters and was proclaimed Emperor, A.D. 69. Soon after he constituted it a Roman colony. After the fall of Jerusalem (A.D. 70) it became the metropolis of Palestine. During the early Christian centuries Cæsarea continued to be a place of importance. Pamphilus, pupil and friend of Origen, had here a famous library (Third Century). Eusebius, the father of Church history, was Bishop of the place 315-318. The town was conquered by the Moslems in the Seventh Century. The Crusaders captured and plundered it in 1101. Among the booty they found, it was claimed, the Holy Grail (q.v.). After various fortunes at the hands of the Crusaders, who rebuilt it on a smaller scale, it was finally destroyed by the Sultan Bibars in 1265. The modern place is only a village on the ancient site.

CÆSAREA PHILIP'PI. An ancient town of Palestine, near the foot of the southern slope of Mount Hermon. On its site is the modern village of Banias, formerly Paneas. Close by the place is a cavern whence issues one of the main sources of the river Jordan. In the Greek period this spring was consecrated to the god Pan. About B.C. 20 the Emperor Augustus gave this region to Herod the Great, who built a beautiful temple of white stone near the old Greek sanctuary, dedicating it to Augustus. On Herod's death the place became a part of the tetrarchy of his son Philip, who built here a town, calling it Cæsarea. It became known as the Cæsarea of Philip (Cæsarea Philippi) (Josephus, Ant. xv. 10-3, xviii. 2-1; Wars of the Jews, i. 21-3, ii. 9-1). Jesus visited the neighborhood for a short period of rest, at which time he more fully disclosed his Messiahship to the disciples (Matt. xvi. 13ff. and parallels). The name of the town was later changed to Neronias in honor of Nero. But the old name Paneas persisted, and outlived the others, since the modern Banias is but a corruption of Paneas.

CÆSAREAN (sê-zā'rê-an), or **CÆSARIAN, OPERATION** (Lat. p.p. *cæsus*, from *cædere*, to cut. Popularly, but in all likelihood erroneously, connected with *Cæsar*). A name which has from very ancient times been applied to the operation of delivering a child through an abdominal incision into the pregnant uterus instead of by way of the natural passages. The operation is of very ancient date. It is supposed to have been practiced by the Greeks, and Pliny mentions that Scipio Africanus and Manlius were born in this way. Children delivered in this manner were known as Cæsones, and from this the name Cæsar was subsequently derived as a family name.

A number of noted persons in history have had their names associated with the operation, as Æsculapius, Julius Cæsar, and Edward VI. of England. In the case of the latter two, however, there seems to be very good evidence that birth was not accomplished in this manner.

There can be no question, however, that the operation was frequently practiced, and its performance was from time to time made a matter of statutory enforcement. Numa Pompilius decreed that every pregnant woman who died should be opened, and the Senate of Venice in 1608 decreed that practitioners should perform the operation, under heavy penalties, on pregnant women supposed to be dead. In 1749 the King of Sicily imposed the punishment of death upon a medical man who neglected to operate on a dying woman advanced in pregnancy.

During these earlier days in the history of the operation it seems to have been practiced almost solely upon women just dead or at the point of death, and to have had for its purpose the saving of the infant alone. The first case in which the operation was performed on a living woman occurred in 1491. Since this date many cases have from time to time been reported of both mother and child having survived the operation, and some of these under the most adverse circumstances. It is only since 1890, however, that the operation has come to take its place as a well-recognized surgical procedure in certain cases where delivery is impossible by natural means.

In brief, the operation is performed by making a vertical incision six or seven inches long in the mid-line of the abdomen over the pregnant uterus. When the uterus is exposed it is drawn into the wound, incised from above downward, and the child and placenta rapidly removed. After this the incision in the uterus is carefully closed by sutures, and it is allowed to fall back into its place. The abdominal wall is then brought together after the usual methods of suture and a suitable dressing applied. A very small death-rate attends the operation as at present practiced.

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A modification of the Cæsarean operation, known as Porro's operation, removes the uterus after it is freed of its contents, thus obviating any possibility of a future pregnancy. Consult Kelly, *Operative Gynæcology* (New York, 1898).

CÆSAR IN EGYPT. A tragedy by Colley Cibber, produced at Drury Lane in 1724, and published in octavo in the following year. Its sources are Beaumont and Fletcher's *False One* and Corneille's *Mort de Pompée.*

CÆSARIO, sē-zā'rĭ-ō. In Shakespeare's *Twelfth Night,* the name under which Viola, in the disguise of a page, enters the service of Orsino.

CÆSARISM. A term applied to that form of absolute rule in which the functions of government are exercised by a single person in whom they have, presumably, been vested by the will of the people. Such a despotism was that of Julius Cæsar, resting on a basis of popularity purchased by the free distribution of bread and gratuitous admittance to the gladiatorial shows, or that of the two Napoleons with its recourse to pliable plébiscites.

CÆSA'RIUS, SAINT OF ARLES. A bishop of the Sixth Century. He was educated in the monastery of Lérins, was appointed in 502 to the episcopal chair of Arles, and introduced into his bishopric many needed reforms. His *Regulæ Duæ* were much used by the founders of orders, previous to the general adoption of the Rule of Benedict. In 529, at the synod of Arausio (now Orange), he defended the Augustinian doctrines against the Semipelagians.

CÆSARIUS OF HEISTERBACH, hīs'tĕr-bäG. A German preacher and historian of the Thirteenth Century. He became a Cistercian friar in the monastery of Heisterbach, and died as prior there. He wrote *De Miraculis et Visionibus sui Temporis* (Cologne, 1591); *Homilia* (ib. 1615); and other works. Consult Kaufmann, *Cæsarius von Heisterbach* (Cologne, 1850).

CÆSARIUS OF NAZIANZUS (? -368). A Christian scholar and writer of the Fourth Century. He was educated at Alexandria, went thence to Constantinople, where many dignities were conferred upon him, and was distinguished for his knowledge of mathematics and physics. He is credited with four dialogues in the Latin editions of Saint Gregory, as also in the *Bibliotheca Patrum;* and Suidas says he wrote a work entitled *Contra Gentes.*

CÆ'SARODU'NUM (*Cæsar* + Gadhel. *dun,* stronghold, fort, AS. *dūn,* Engl. *down,* Latinized *dunum*). The ancient name of Tours, meaning 'Cæsar's Fort.'

CÆSARS, THE CITY OF THE. A legendary city of South America sought by many explorers of the Sixteenth and Seventeenth centuries. It is generally supposed to have been built by a member of the party of Sebastian Cabot, Cæsar by name, on the eastern slope of the Andes, near the middle western border of Argentina, in the second quarter of the Sixteenth Century. Another legend holds that it was founded by a shipwrecked Spanish crew, in the same locality and time.

CÆSAR'S HOUSEHOLD (Lat. *familia Cæsaris,* Gk. ἡ Καίσαρος οἰκία, *hē Kaisaros oikia*). A phrase used in the Epistle to the Philippians (iv. 22, "All the saints salute you, especially they that are of Cæsar's household"). In its later and more developed usage, it referred to the Imperial household as embracing, not merely the immediate servants of the palace, but the whole list of the Emperor's attendants, amounting to a considerable portion of the city's population, and including in its number persons of rank, as well as freedmen and slaves. At the time when Philippians was written, however, the usage of the phrase was restricted, and denoted merely the direct servants and dependents of the Imperial establishment, who were exclusively slaves or freedmen.

The purely incidental character of the reference in the Epistle indicates that these members of the Emperor's household were known to parties in the Church at Philippi, being perhaps originally from that neighborhood in the East. If, therefore, as there is every reason to suppose, this Epistle, as the first of Paul's captivity letters, was written early in his imprisonment, these Imperial servants were in all probability brought into the Church before Paul's arrival in Rome, having possibly learned the Gospel in Philippi itself. At all events, they were more likely of Grecian than of Latin origin, Greeks and Orientals being especially numerous in Nero's household. The names of some of the Imperial attendants of this period, as recovered from the columbaria, occur in the list of salutations in Rom. xvi. Consult: J. B. Lightfoot, *Commentary on Philippians,* 7th ed. (London, 1883); Th. Zahn, *Einleitung in das neue Testament,* Vol. I., 2d ed. (Leipzig, 1900).

CÆSIUM, sē'zĭ-ŭm (Lat. *cæsius,* bluish-gray). A chemical element discovered spectroscopically, in 1860, by Bunsen and Kirchhoff. It is found, in very small quantities, in certain mineral waters and in a number of minerals, including lepidolite, petalite, and certain feldspars. The only mineral which contains considerable quantities of it is the rare mineral pollux, found on the Isle of Elba, this mineral containing as much as 34 per cent. of cæsium oxide. The preparation of metallic cæsium involves the complete separation of its compounds from those of the other elements (iron, aluminium, the alkaline earths, and especially potassium and rubidium) that may be present in the given source; further, the transformation of the pure cæsium compound obtained into the cyanide, and, finally, the electrolytic decomposition of the cyanide. The pure metal is very similar to potassium, and has a great avidity for oxygen, readily taking fire if exposed to the air. It is white, with a metallic lustre, has a specific gravity of 1.88, and melts at 27° C. (80.6° F.). Its chemical symbol is Cs; its atomic weight, 132.9. Its spectrum shows two characteristic lines in the blue part.

CAETANI, kä'ā-tä'nē, MICHELANGELO, Duke of Sermoneta (1804-82). An Italian student of Dante, born in Rome. He was best known for his commentaries on the *Divina Commedia,* including *Della dottrina che si asconde nell' ottavo e nono canto dell' Inferno* (1852); *La materia della Divina Commedia* (1865); and *Tre chiose nella Divina Commedia* (1876).

CĀF, käf, **KĀF** (or more properly, QAF). The mountain, or range of mountains, which in Arabic and Persian fiction surrounds the earth. The pivot on which the mountain rests is a great emerald from which the sky receives its colors,

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and the mountain is the dwelling-place of giants and genii. 'From Käf to Käf' signifies from one end of the world to the other. The name Käf is sometimes applied also to the Caucasus range.

CAFÉ PROCOPE, kä'fā' prō'kōp'. See PROCOPER CAFÉ.

CAFFA, käf'fā. See KAFFA.

CAFFARELLI, käf'fā-rēl'lē, GAETANO MAJORANO (1703-83). An Italian vocalist who, when a boy, was deemed the first soprano of the age. He was highly successful for many years, having no rival, excepting, possibly, Farinelli.

CAFFEINE, käf-fē'in, **THE'INE**, or **GUARANINE**, gwä'rä-nīn' (Brazil) (from Neo-Lat. *caffea*, coffee), $C_8H_{10}N_4O_2 + H_2O$. An alkaloid found in tea, coffee, and other vegetable products. It is a solid substance, crystallizing in long, flexible, colorless needles, which melt at 225° C. It combines with the strong mineral acids to form salts, such as the hydrochloride of caffeine—which are, however, very unstable. Pure caffeine is odorless, has a bitter taste, and is permanent in the air. If its solution in chlorine water is evaporated to dryness and the remaining residue redissolved in dilute ammonia water, a beautiful violet-red coloration is obtained. By this reaction the presence of caffeine may be detected in samples submitted for examination. Caffeine may be extracted from the tea by treatment with hot water and the subsequent addition of lime; the mixture thus obtained is evaporated to dryness, and the caffeine is dissolved out of the residue by chloroform. It may be prepared from coffee by the following process. The coffee is extracted with water; the solution is precipitated with lead acetate and filtered; sulphuretted hydrogen is passed into the filtrate to eliminate the excess of lead acetate added; the solution is then rendered more concentrated by evaporation and is neutralized with ammonia; on cooling, crystals of caffeine separate out, which may be purified by recrystallization from water. The amount of caffeine found in tea and coffee varies with the product—coffee usually contains less than 1 per cent., while amounts varying between 2 and 4 per cent. have been found in different samples of tea. The alkaloid is supposed to exist in these products in combination with tannic acid and potassium. Caffeine has absolutely no nutritive value. If taken in moderate quantities, it has the effect of increasing the blood-pressure and of stimulating the cerebrum, thus increasing the reasoning power and the imagination; it is even believed to increase the powers of muscular endurance. Larger quantities, however, are liable to cause trembling of the muscles, and toxic doses have the effect of paralyzing the heart. The symptoms of caffeine-poisoning are buzzing in the ears, flashes of light, a heavy feeling in the head, restlessness, insomnia, a vapid and feeble pulse, coldness of surface, and rise of central temperature. Even moderate quantities of tea and coffee are in some persons liable to cause irregularity of the heart. Therapeutically caffeine is used to combat certain forms of nervous and cardiac depression, certain headaches and neuralgias, gout, the insomnia of alcoholism, and opium narcosis. It is also used as a diuretic. Caffeine was discovered in coffee in 1820 and in tea in 1827 (theine); in 1838 Jobst proved the identity of caffeine and theine, and in recent years Emil Fischer succeeded in producing the substance artificially. Fischer determined the chemical constitution of caffeine, and showed that it is closely allied to uric acid, as well as to the alkaloid theobromine.

CAF'FER BREAD. See KAFFIR BREAD.

CAFFRA'RIA. See KAFFRARIA.

CAF'FRE CAT. See CAT.

CAFFRISTAN, käf'frē-stän'. See KAFFIRISTAN.

CAFFI, käf'fē, IPPOLITO (1814-66). An Italian painter. He was born at Belluno, and studied in Venice. He painted many classical scenes and numerous fine frescoes. He met his death on the battle-ship *Re d'Italia* during the naval engagement off Lissa, July 20, 1866, in which he had participated in order to prepare a picture of the conflict. He excelled in the production of peculiar light-effects, and in his admirable management of perspective. His principal paintings are the following: "Carnival Scene on the Piazzetta, Venice" (1855), "Panorama of Rome," "Isthmus of Suez."

CAF'FYN, KATHLEEN MANNINGTON (? —). An English novelist, born at Waterloo House, in Tipperary, Ireland. She was trained to become a nurse, married Mannington Caffyn, a surgeon, and author of the popular novel *Miss Milne and I* (1889), with whom she went out to Sydney, Australia. After her husband's death she took up novel-writing under the pen-name Iota. She became widely known by *A Yellow Aster* (1894), a problem novel, which has been followed by *Children of Circumstances* (1894); *A Comedy in Spasms* (1895); *A Quaker Grandmother* (1896); *Poor Max* (1898); *Anne Mauleverer* (1899); *The Minx* (1900); and *The Happiness of Jill* (1901).

CAGAYANE, kä'gä-yä'nā. A Malayan people on the Rio de Cagayan, northeastern Luzon. Their speech is Ibanag. See PHILIPPINES.

CAGE-BIRDS. The practice of keeping birds in captivity for the enjoyment of their songs, or for entertainment from their habits, or for admiration of their beauty, dates back so far that we have no knowledge of its origin. It existed among the nations of Asia before the time of Alexander, and it is said that elaborate bird-cages of ivory and gold were among the extravagances of Rome. When the islands of the Pacific Ocean were first visited, parrots were found captive among nearly all the tribes, and the natives of tropical countries generally capture and keep birds alive about their dwellings. In civilized countries at the present time, great numbers of birds are so kept, and thousands are annually imported into America in addition to many native favorites. Birds are captured for the market both by means of nets and with birdlime, but more commonly the young are taken from the nest and artificially reared. Many cage-birds, however, breed well in captivity, and such species are often reared in great numbers. A notable instance of this is the common canary, which, although a native of the Canary Islands, is bred in Europe, especially in the Harz Mountains, where the raising of fine canary songsters is an important cottage industry. The bird has become considerably modified under these conditions, and those reared for cage purposes differ markedly from the wild individuals in their native islands. The question of the ethics of

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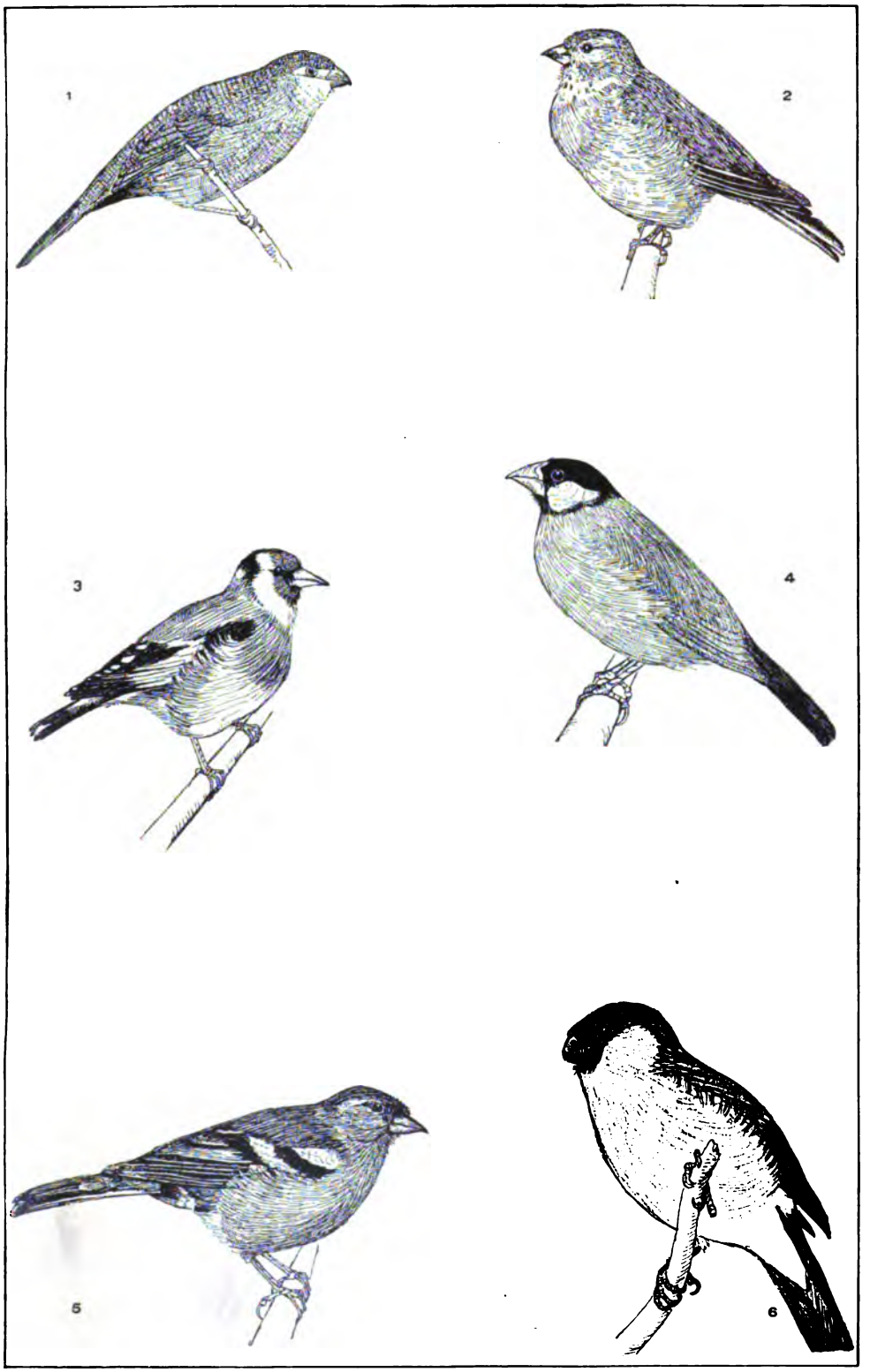
TYPICAL CAGE BIRDS



1. AMADAVAT (Estrilda amandava).
2. LINNET (Acanthis cannabina).
3. GOLDFINCH (Carduelis carduelis).
4. JAVA SPARROW (Munia oryzivora).
5. CHAFFINCH (Fringilla cœlebs).
6. BULLFINCH (Pyrrhula Europæa).

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keeping birds in captivity has recently been discussed not a little, but this is hardly the place to enter into the subject. Suffice it to say that the conditions under which the bird is kept, and its early history, profoundly modify the case. There can be no doubt that a canary bred in captivity, whose ancestors were captives, and which has never been at liberty, is far better off in a cage, if properly cared for, than if it were free, while it is equally true that to confine in a cage an adult bird, which has known the use of its wings and learned to get its own living, is wanton cruelty.

Cage-birds may be roughly classed as song-birds, talkers, and plumage-birds. Of song-birds, the canary is undoubtedly the most popular and best known, but the nightingale, bullfinch, goldfinch, and several European thrushes, the mocking-bird, cardinal-bird, and brown thrasher of North America, and the bulbuls and dhyals (magpie-robins) of India, are other widely known species whose beauty of song has brought them into captivity, not only in America, but in nearly all parts of the civilized world. Of the talkers the number of species is comparatively small, the best known being several species of parrot, the starling, and the mina-bird of India. The plumage-birds are legion, but are chiefly from the tropics, though a few are from warm-temperate regions, as the summer red-bird of the southern United States. The parrakeets and love-birds, the painted finches, the cockatoos, and some large parrots and macaws are good examples of brilliant color, while the whydah-bird is one of those which are kept for some oddity of plumage. Birds differ greatly in their ability to stand captivity, especially when that involves a marked change of climate. Insectivorous birds are the most difficult to keep, not only because of the difficulty of furnishing sufficient food, but because under normal conditions the obtaining of their food requires great activity, and the sedentary life of a cage reacts unfavorably. Grain-eating birds are usually easily kept because the change in their lives is not so great. But it is not wholly a matter of food, for though parrots are easily supplied with food, many die in the early days of their captivity. Indeed, it is said that 95 per cent. of the African gray parrots brought to Europe die before they have been taught to speak. With these birds, however, it is probably largely a matter of climate, the low temperatures, and especially the sudden and marked changes of temperature, proving too much for their tropical natures. In the United States it is better to purchase parrots in the spring and let them enjoy the natural heat of summer out of doors, guarding carefully against sudden changes. The best parrot for talking purposes is probably what is known as the double-fronted, yellow-faced Amazon, the *Chrysotis ochrocephala* of ornithologists. This is a South American species, but is hardy both in America and Europe. Parrakeets and love-birds cannot be taught to speak, but their gentle habits and beautiful plumage make them great favorites. The cockatoos and great macaws are only with great difficulty taught to speak, and never make good talkers. They are noisy birds and disagreeable in other ways, but their great beauty induces many people to keep them.

Management.—In keeping any bird in captivity, it should be the constant endeavor to make the surrounding conditions as natural as possible. When free, all birds are scrupulously clean; even the worst carrion-eaters keep themselves clean from dirt of every kind. Therefore cleanliness in the cage is one of the first matters to be attended to, and this is obviously of special importance when the attractive feature of the bird consists of remarkably developed plumes, like some of the tail-feathers of the whydah-bird. The cage should be large enough so that the bird may move about freely and change its positions easily without injuring its tail-feathers or any plumage ornaments. The perches should always be of soft, unpainted wood, and not too slender. The bird should have plenty of light, except at night; artificial light is almost certainly injurious, and cages in illuminated rooms should be veiled. The cage ought not to be in direct sunlight except in winter, and even then only for a comparatively short time. Water should be given a bird plentifully and ought to be always fresh. Most birds enjoy a bath, and opportunity should be frequently given for a bird to wash itself; the basin ought to have a dark interior, or gravel on the bottom, so that the bird may judge the depth of the water. After a bath the bird should be placed in the sun until dry. Occasionally, if possible, let the bird out of the cage and permit it to exercise in the larger freedom of a room or similar inclosure. Most birds need to be protected from sudden changes, draughts, and extremes of temperature, so that the cage ought not to hang near an open window or a door likely to be opened, except, perhaps, on still summer days; but fresh air is a prime necessity for most birds, and artificial heat, especially if very dry, is usually injurious. Owing to lack of exercise, by which they can be worn away, the nails and sometimes the bills of captive birds become so overgrown as to be a serious detriment to the health; therefore, opportunity for scratching ought to be provided in the shape of sand or heavy sandpaper, while for the bill a piece of cuttlefish-bone or some similar substance should be attached to the sides of the cage. Birds should never be unduly alarmed. Like all other animals, they deserve and will repay perfect kindness and gentleness in their treatment.

Food.—Most of the ailments of cage-birds come from an improper diet. The food may not be of the right sort, or it may be too scanty or too abundant. Few, if any, cage-birds are exclusively insectivorous, but even those which normally take much insect food also eat more or less vegetable matter. Insectivorous birds may be given meat when insect food is not abundant, and it is said that a diet of spiders is particularly good for such birds when they are not in perfect health. Nearly all cage-birds will eat seeds, and as a universal bird-food the seed of canary-grass is unequaled. It may be mixed with rape or hemp, and millet and even oats are sometimes used. Even parrots like canary-seed and are said to thrive on it. Seed-eating birds ought, however, to be given fresh vegetable matter sometimes, in the form of soft green leaves or fruit that is not acid. Such plants as chickweed and lettuce, put into the cage cool and fresh, are a valuable addition to the bird's diet. The greatest danger to birds is in overfeeding, underfeeding being very unusual. If a bird shows signs of ill health, it should, if possible, be placed

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in a fresh cage, in new surroundings, given rather less food and that of the simplest kind. A drop of castor-oil placed in the bird's mouth by means of a brush often proves beneficial, but the chief reliance should be placed on changed surroundings, quiet, and a simple diet.

Aviaries are outdoor inclosures in which birds are kept and reared in comparative freedom. They are common in the tropics and in England, but the harsher climate of the United States and other conditions have rendered them less popular here than is desirable. Aviaries, however, are really only large cages, and governed by similar rules. The breeding of cage-birds is a special department, instructions for which will be found in the books mentioned below. See CANARY; PARROT; BULLFINCH, and the names of various other cage-birds.

BIBLIOGRAPHY. Bechstein, *Cage and Chamber Birds* (London, 1864; a most complete work; colored plates); Greene, *Notes on Cage-Birds* (London, 1899; illustrated); Dixon, *Dovecote and Aviary* (London, 1851); Holden, *Book on Birds* (Boston, 1875); Greene, *Diseases of Cage-Birds* (London, 1897). See Plate of CAGE-BIRDS.

CAGLI, kä'lyê (anciently, *Callium*, *Calles* of the Sabinians). An episcopal city in central Italy, in the Province of Pesaro e Urbino, on the Burano, 76 miles west of Ancona by rail (Map: Italy, G 4). The cathedral is beautiful, and the Church of San Domenico contains a Madonna and a Pietà by Giovanni Santi, Raphael's father. On a stream at the foot of the hill on which the town is built is an ancient bridge constructed of huge blocks of stone. There are silk-factories here. Population (commune), in 1881, 10,000; in 1901, 11,927.

CAGLIARI, kä-lyä'rê (anciently, Lat. *Carilis*). An archiepiscopal city of Italy, capital of the Province of Cagliari and of the island of Sardinia, at the southern end of which it is situated. It is on the slope of a steep hill 300 feet high which overlooks the Gulf of Cagliari, and is partially surrounded by extensive lagoons utilized for the manufacture of salt. The old section of the town, called the Castello, still has its ancient gates, towers, and walls, and contains the principal public buildings and palaces of the nobility. There are thirty-eight churches besides the cathedral, which was completed in 1312 by the Pisans, and has been almost entirely modernized. Below the ancient amphitheatre, which faces the sea and most of the seats of which were hewn out of the living rock, are the botanical gardens, which contain remains of Roman reservoirs and subterranean water-courses. The extensive Necropolis has Punic and Roman tombs hewn out of the rock. A number of Roman private houses have also been excavated. The university, founded in 1596 by Philip III. of Spain, and remodeled in 1764 by Charles Emmanuel of Savoy, has about 250 students, a library of over 70,000 volumes, and excellent mineralogical, paleontological, and zoölogical collections, and in the antiquarian museum there is the most complete and interesting collection of Sardinian antiquities. Cagliari has a street railway, omnibuses, and diligences, is the railway centre of Sardinia, is connected with the mainland by submarine cable and by regular steamboat service to Genoa, and is the residence of a United States consular agent. There are three theatres, and of the numerous festivals that of Saint Ephisius (May 1-4), when peasants in picturesque costume conduct the body of the holy man from Cagliari to Nora, is the most famous. The principal manufactures are firearms, powder, cotton goods, hats, and a kind of sweet cake. Ship-building is carried on. The principal exports are grain, flax, wine, cheese, goatskins, and salt; the principal import is lumber. Population (commune), in 1881, 39,000; in 1901, 54,000. Cagliari was founded by the Phœnicians.

CAGLIARI, PAOLO. See VERONESE, PAOLO.

CAGLIOSTRO, kä-lyō'strô, ALESSANDRO, Count (1743-95). An Italian impostor, whose real name was Giuseppe Balsamo. He was born in Palermo, of poor parentage, June 2, 1743. When thirteen years old he ran away from a seminary where he had been placed, and was afterwards sent to a monastery at Cartagiore. Here he became assistant to the apothecary of the monastery, and picked up that scanty knowledge of chemistry and medicine which, in an age at once skeptical and credulous, imposed upon so many respectable individuals. He left the monastery or was ejected, and for a time led 'the loosest life' in Palermo. When 26 years old, he found it highly advisable to leave his native place. In company with a certain sage named Althotas, Cagliostro is vaguely represented as traveling in Greece, Egypt, and Asia. In Venice he married a very beautiful woman named Lorenza Feliciana, who became a skillful accomplice in his schemes, and captivated many admirers, while Cagliostro swindled them. In Italy and Germany he posed as a physician, philosopher, alchemist, Freemason, and necromancer, and did a lively business in his 'elixir of immortal youth.' He was not so successful in Saint Petersburg at the Court of the shrewd Catharine II. From Saint Petersburg he went to Warsaw, where he grew rich on titled dupes in spite of being exposed. In 1780 he was in Strassburg, later in Paris, then in England, and in 1785 again in Paris, where he was lodged in the Bastile for his share in the affair of the Diamond Necklace (q.v.). His plausibility secured his liberation, and he went to England, but there and elsewhere he found little scope for the continued exercise of his peculiar talents, and he returned to Italy in 1789. He had established a spurious Egyptian Masonic rite, and his continuance in this work in Rome led to his condemnation by the Inquisition. His sentence of death was commuted to life imprisonment, and he died in 1795. His wife ended her days in a convent.

BIBLIOGRAPHY. In *Notes and Queries*, Fourth Series, Vol. X. (London, 1872), appeared a Cagliostro bibliography by William E. A. Axon, who had just written (1871) a series of papers on Cagliostro for the *Dublin University Magazine*. Consult: in Thomas Carlyle's *Miscellaneous Essays*, "Count Cagliostro;" also, *The Life of Count Cagliostro* (London, 1787); *The Life of Joseph Balsamo, Commonly Called Count Cagliostro*, etc. (London, 1791). Much spurious material has appeared concerning Cagliostro's life. Such are the so-called *Mémoires authentiques* (Paris, 1786).

CAGNACCI, kä-nyä'chê. See CANLASSI.

CAGNAT, kä'nyä', RENÉ LOUIS VICTOR (1852—). A French classical archæologist, born in Paris. He was appointed professor of Roman

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epigraphy and antiquities at the Collège de France in 1895, and is the author of *Etude historique sur les impôts indirects chez les Romains* (1882); *Explorations épigraphiques et archéologiques en Tunisie* (1883-86); *L'armée romaine d'Afrique* (1892); *Recherches et découvertes archéologiques dans l'Afrique du Nord* (1892); *Découvertes nouvelles en Tunisie* (1896); *Cours d'épigraphie latine*, 3d ed. (1898); and various other archæological and epigraphical works.

CAGNOLA, kä-nyō'lä, LUIGI, MARCHESE (1762-1833). An Italian architect. He was born in Milan of an ancient and wealthy family, and early devoted himself to architecture. His master works are two triumphal arches which he built at Milan by order of Napoleon. The first is the Porta di Marengo (later known as the Porta di Ticino), a work of great beauty, built of Alpine granite. The second is the famous Arco della Pace, begun in 1807, but not finished until 1838. It is constructed of white marble, and is one of the largest and noblest structures of the kind in Europe, reaching the height of 78 feet. On the top of the arch is a bronze figure of Peace, in a car drawn by six horses, while the sides are richly adorned with innumerable bas-reliefs. Besides these may be mentioned the Campanile at Urgnano and the chapel of Santa Marcellina in the basilica of Sant' Ambrogio, Milan.

CAGNONI, kä-nyō'nē, ANTONIO (1828-96). An Italian composer, born at Godiasco, Voghera. He was a pupil of the Milan Conservatory, and afterwards became *maestro di cappella* at Vigevano. His works include much church music composed at this time, and about twenty operas of unequal merit, among them *Rosalia di San Miniato* (1845); *Il testamento di Figaro* (1848); and *Il vecchio della montagna* (1863).

CAGOT, kä'gō', also known as CAGOTS, CAQUEUX, COLLIBERTS, etc. An alien or outcast people living chiefly in the Pyrenees of southern France and extreme northern Spain. Their origin is unknown. They have been thought to be descendants of the Visigoths, but are more probably autochthones concentrated in a sterile and rugged land by pressure from more progressive peoples without. Except that they are sedentary, their habits and customs are not unlike those of the gypsies (q.v.). Before the French Revolution they were regarded as Ishmaelites, and often treated as heretics or lepers, their relations with neighboring peoples affording a most notable example of the persistence of primitive race-sense into modern times. Cretinism, goitre, and various deformities and incapacities are exceptionally common among them; by some they are thought to be distinguished by the absence of the lower lobe of the ear; and these peculiarities have aided in holding contemporaries aloof from them. Since 1790 they have been recognized as citizens. Their language is a blend of neighboring tongues with a few peculiar terms and forms.

CAGSAUÁ, käg-sä'wä. A town of Luzon, Philippines, in the Province of Albay, situated two miles north of Albay. Population, in 1898, 20,450.

CAHABA, kä-hä'bä, or **CAHAWBA**. A river rising near Birmingham, in Jefferson County, Ala., flowing nearly south through a region rich in coal, and joining the Alabama River at Cahaba, 10 miles southwest of Selma (Map: Alabama, B 3). Cahaba is navigable for small craft for nearly 100 miles.

CAHAN, kä'hän, ABRAHAM (1860—). A Russo-American author, born at Vilna (Russia). He was educated at the Vilna Teachers' Institute, and in 1882 came to the United States, where he was for a time editor of two Yiddish publications, a weekly paper and a monthly periodical. His works include *Yeke, a Tale of the New York Ghetto*, generally regarded as the most important fictional study of Jewish life in America, and another similar book, *The Chasm*.

CAHENS'LYISM. A name given to the plan proposed in 1892 by the German Catholic Bishop Cahensly, who advised that the foreign-born population of the United States should be divided, for ecclesiastical purposes, according to their European nationality, under priests speaking their own languages, and of like race. This plan, which would tend to perpetuate in this country the racial divisions of Europe, was vigorously and successfully opposed by Cardinal Gibbons, Archbishop Ireland, and other leaders of the 'American party' in the Roman Catholic Church.

CAHORS, kä'ōr' (anciently, Lat. *Cadurcum*, from the Celtic tribe *Cadurci*; earlier *Divona*, 'the sacred source'). A town of France, capital of the Department of Lot, and seat of a bishopric, situated on a small, rocky peninsula, formed by a bend of the river Lot—here crossed by three bridges—about 60 miles north of Toulouse (Map: France, H 7). It consists of the upper and lower city, and among its antiquities are the fine Romanesque cathedral, the ruins of a Roman temple and aqueduct, and tower of the ancient royal palace (Fourteenth Century). There is also a monument of Fénelon, who studied at Cahors, also statues of Gambetta, who was born at Cahors, and of Clément Marot. Among the institutions are a library of 13,000 volumes, a girls' school, and a museum. It has manufactures of cotton-yarn, woolens, leather, paper, glass, etc.; the district produces a famous red wine which bears its name. Population, in 1896, 14,502.

CAIAPHAS, kā'yä-fas. A high priest of the Jews, appointed by the Roman procurator, Valerius Gratus, in the reign of Tiberius Cæsar, at the beginning of Christ's ministry. He was in office at the time of the trial and crucifixion of Jesus, but was removed by Vitellus A.D. 37 (Josephus, *Antiq.* xviii. 2, 2; 4, 3.) His wife was the daughter of Annas, a former high priest (A.D 7-14). The chief priests were at this time largely Sadducees, and it is to be noted that in the trial of Jesus and subsequent persecution of the Apostles they were more prominent than the Pharisees. In a general council summoned to take action upon the spread of the doctrines of Jesus, Caiaphas was decidedly in favor of putting him to death, using this language: "Ye know nothing at all; nor do ye take account that it is expedient for you that one man should die for the people, and that the whole nation perish not." (John xi. 50; John says he 'prophesied,' verse 51; cf. xviii. 14.) Christ was arraigned in the court of the high priest, and when the effort to convict him through the testimony of witnesses who are designated by Matthew (xxvi. 60) and Mark (xiv. 56-57) as false, failed, the prisoner was called as a witness and asked if he was

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indeed the Christ, Son of God. The answer being in the affirmative (Matt. xxvi. 64), the high priest pretended to be sorely grieved at what he considered blasphemy, and appealed to Christ's enemies to say if that was not enough. The answer was that Christ deserved death, and according to Matt. xxvii. 1, and John xviii. 28, the sentence was ratified at a formal meeting of the Sanhedrin on the following morning. The high priest, however, did not have the power of final condemnation, which rested with the Roman authorities, to whom Jesus was accordingly handed over. Later Caiaphas persecuted the followers of Jesus (Acts iv. 6, v. 17).

CAIBARIEN, kī-bär'rē-ān'. A seaport on the northern coast of Cuba, in the province of Santa Clara. It has some coastwise trade and sponge-fisheries (Map: Cuba, F 4). Population, in 1899, 7013.

CAICOS (kī'kōs) **ISLANDS** (Sp. *cayo*, rock, shoal, islet in the sea). A group of small islands at the southeastern extremity of the Bahamas, lying between latitude 21° and 22° N., and longitude 71° and 72½° W. (Map: West Indies, M 4). Though geographically a portion of the Bahamas and formerly under the government of Bahama, they form with Turk Islands a separate government under the Governor of Jamaica. There are, including the Turk groups lying southeast, more than thirty small islands, having an area of less than 200 square miles, but only six are inhabited. The largest is Grand Caicos, which is 20 miles long by 6 broad. The seat of government is at Grand Turk. The chief industry is salt-raking, and a considerable amount of salt is exported annually to the United States, Canada, and Newfoundland. There is also a sponge-fishery. Population, about 5000.

CAIFA, kī'fä, or **HAIFA**, hī'fä. A seaport of Syria, on the Bay of Acre, lying upon a spur of Mount Carmel (Map: Palestine, A 2). Since the establishment of direct steam connection with Europe, and the completion of the railway line from Damascus, the little seaport has grown rapidly in commercial importance, and promises to be a strong rival of Acre, over which it has the advantage of a safe harbor. There are a number of missionary schools, and not far from the town is a settlement of German Templars, established there since 1869. Population, about 10,000, mostly Mohammedans.

CAILLETET, kä'ye-tä', LOUIS PAUL (1832—). A French chemist and ironmaster, born at Châtillon-sur-Seine. He studied at the School of Mines in order to engage in the iron industry in his native town. In addition to his business interests, he devoted himself to the study of chemistry and worked on original researches, paying especial attention to metallurgical investigations and the liquefaction of gases. In 1877 he succeeded in liquefying both oxygen and nitrogen. For this work he was honored by election to the Académie des Sciences, first (1877) as a corresponding member and then (1884) as a full member. In 1889 he was appointed an officer of the Legion of Honor. A few days after Cailletet's discovery Raoul Pictet (q.v.), a Swiss chemist, succeeded in obtaining the same result by another method.

CAILLIAUD, kä'yō', FRÉDÉRIC (1787-1869). A French traveler. After visiting southern Europe, Asia Minor, and Egypt, he was engaged by Mehemet Ali to explore the deserts along the Nile and near the Red Sea. On this voyage he discovered the emerald-mines of Mount Zabara. He returned to France with a valuable collection of antiquities, plants, and minerals, and published *Voyage à l'oasis de Thebes* (1821). He went again to Egypt and made explorations in 1821-22 in the eastern deserts, accompanying Ibrahim Pasha on his expedition of conquest to Sennar. Among the relics of antiquity brought by him to France and purchased by the Government was a mummy, inscribed with hieroglyphic characters accompanied by a Greek translation, which proved of great help to Champollion in the study of the ancient language. He published *Voyage à Méroé* (1826-27) and several other works on the antiquities and present customs of Egypt.

CAILLIE, kä'yä', RENÉ (1799-1838). A French traveler. He was born at Mauzé, Deux-Sèvres, and early in life became a traveler in Africa, supporting himself by trade with the Moors, from whom he learned Arabic. He dressed as an Arab and passed as an Egyptian. He penetrated as far as Timbuktu in 1828, and for this exploit received a prize of 10,000 francs from the Geographical Society of Paris, besides a pension of 1000 francs and admission to the Legion of Honor. His notes of travel, arranged by M. Jomard, were published under the title *Journal d'un voyage à Tombouctou et à Jenné dans l'Afrique centrale* (3 vols., 1830).

CAIMACAM, kär'mä-käm', or **KAIMAKAM** (Turk. *qāimaqām*, Ar. *qā'im*, *maqām*, literally, substitute from *qā'im*, standing, *scil.* in another's + *maqām*, place). A Turkish officer corresponding to lieutenant-colonel in the army, or lieutenant-governor in the civil service. The Caimacam of Constantinople is the lieutenant of the Grand Vizier, whom he represents in processions. Such officers also act as governors in the principal towns.

CAIMAN, kā'man. See CAYMAN.

CAIN. According to biblical tradition, the first born of Adam and Eve. His story is given in Gen. iv., which belongs in substance to J in the modern distribution of the Pentateuchal sources. He tilled the soil and brought its fruits to God in sacrifice. When he found that his brother Abel's sacrifices of sheep were accepted, probably because made with love of God, as his were not, he became jealous of Abel, and slew him. The murderer was banished by the Almighty from the ancestral home, and on him was put some sign "lest any one finding him should smite him." He went with his wife to the land of Nod and there laid the foundation of the first city. The name Cain is explained in Gen. iv. 1 as meaning 'acquisition'; but others take it as 'spear,' or 'smith.' Canon Cheyne and others of the modern critical biblical school consider that Gen. iv. is composed of several stories relating to different Cains, and that one of them was the eponym of the Kenitos. Their story of this latter Cain was intended to explain the invincible Kenitish aversion to dwelling in cities, and preference for the nomad state, by linking the Kenite with the first wanderer.

Cain is alluded to in the New Testament as synonymous with a wicked man (Heb. xi. 4; I. John iii. 12; Jude, verse 11).

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CAIN: A MYSTERY. A tragedy by Lord Byron, begun at Ravenna, July 16, 1821, completed September 9, and published in December of the same year. It deals with the biblical tale of the fraternal jealousy, the temptation by Lucifer, and the final murder and expulsion from Eden. It is remarkable as an extremely ingenious appeal for sympathy with the title-character.

CAIN, kā'ăn', AUGUSTE NICOLAS (1822—). A French sculptor, born in Paris. He studied under Guionnet and Rude, and became well known for his depictions of animal life, in particular of large birds and beasts of prey. Among these may be cited, "Eagle Defending its Quarry" (1852); "Lion" (1874; Luxembourg Gardens); "Combat Between Two Tigers" (1878); "Rhinoceros Attacked by Tigers."

CAINE, THOMAS HENRY HALL (1853—). An English novelist and dramatist. He was born at Runcorn, Sheshire, of Manx descent, but now makes his home on the Isle of Man. Most of his books deal with Manx characters and subjects. He was an architect in early life, but became a journalist. During the last year of Rossetti's life, Mr. Caine lived with him, and in the same year (1882) published *Recollections of Rossetti.* Among his other publications are *The Shadow of a Crime* (1885); *The Deemster* (1887); *The Bondman* (1890); *The Scapegoat* (1891); *The Manxman* (1894); *The Christian* (1897); and *The Eternal City* (1901). Several of his novels have been dramatized. He visited Canada and the United States in 1895-96 to promote the international copyright movement.

ÇA IRA, sä ē'rä' (Fr., it will go, equivalent to our 'it's all right'). A French Revolutionary song, the words by Ladre, a street singer, and the melody originally a popular *carillon* by Bécourt, and a favorite air of Marie Antoinette. The song is said to have been first sung when the mob marched to Versailles, October 5, 1789. At the beginning of the Revolution, when all France was wild over Liberty, Equality, and Fraternity, the song ran,

> "Ah, ça ira, ça ira, ça ira.
> Celui qui s'élève, on l'abaissera,
> Celui qui s'abaisse, on l'élèvera;"

but later, when the fierce passions began to stir, came the refrain, *Les aristocrates à la lanterne.*

CAIRD, kârd, EDWARD (1835—). An English educator and philosophical writer. He was born in Scotland, and was educated at Glasgow and Oxford universities. He became professor of moral philosophy at Glasgow University in 1866, and succeeded Dr. Benjamin Jowett as master of Ballick College, Oxford, in 1893. His published works include *The Critical Philosophy of Immanuel Kant* (1889); *Essays on Literature and Philosophy* (1892); and *The Evolution of Religion* (1893).

CAIRD, JOHN (1820-98). A minister of the Established Church of Scotland, and one of the most eloquent preachers in Great Britain. He was born at Greenock, on the Clyde, December 15, 1820. He studied at the University of Glasgow, and in 1845 was ordained to the pastorate of the church of Newton-on-Ayr, whence in 1847 he was transferred to Lady Yester's, Edinburgh. Here his popularity was extraordinary, but the demands made on his physical energies were so great that he found it necessary to retire to the country, and accepted, in 1849, the country charge of Errol, in Perthshire. A sermon which he preached before the Queen in 1855, in the Church of Crathie, and which was published, by royal command, under the title of *Religion in Common Life,* was universally admired throughout Great Britain, translated into German, and published on the Continent under the auspices of Chevalier Bunsen, who wrote a preface to it, and suddenly carried the fame of the author into all parts of the Protestant world. In 1857 Dr. Caird accepted a call to Park Church, Glasgow. In 1862 he was appointed professor of divinity, and in 1873 principal of Glasgow University. He published *Introduction to the Philosophy of Religion* (1880; 2d ed., 1900); *Spinoza* (1880); posthumously appeared, edited by his brother, E. Caird, *University Sermons* (1898); *University Addresses* (1898); *The Fundamental Ideas of Christianity* (with Memoir, 2 vols., 1899). He died at Greenock, July 30, 1898.

CAIRN, kârn (Gael. *carn,* heap of stones). In archæology, a name applied to a heap of stones erected over a grave or over a body not otherwise buried, or as a landmark. Among advanced peoples cairns are commonly used to mark stations of exploration or survey; among primitive peoples a mystical meaning commonly attaches to such structures. Thus certain American tribes build cairns as divide-marks on their trails by carrying stones up-hill as symbols of the journey, and then casting them aside on the growing heap as tangible emblems of relief from the labor of ascent. See ARCHÆOLOGY.

CAIRNES, kârnz, JOHN ELLIOTT (1823-75). An Irish economist. He was born at Castle Bellingham, County Louth, December 26, 1823, and was educated at Trinity College, Dublin. He studied law, and was admitted to the Irish bar, but passed most of his time in writing for the press, chiefly upon economic questions affecting Ireland. In 1856 he was appointed professor of political economy in Dublin, and the next year his professorial lectures were published under the title *Character and Logical Method of Political Economy.* He next wrote for *Fraser's Magazine* a series of essays on the gold question, induced by the sudden increase of supply from California and Australia. In 1859 he was appointed professor of political economy and jurisprudence in Queen's College, Galway. In 1862 he published his work on *The Slave Power,* in which he warmly advocated the course of the Northern States, from the standpoint of the economist fully aware of the superiority of free to slave labor. His conclusions were to a large extent verified by the results of the war. In 1866 he was appointed professor of political economy in University College, London. From 1860 till his death, which occurred on July 8, 1875, he suffered greatly in health, and this of necessity restricted his powers of production; nevertheless this was the period in which he wrote his chief work, *Some Leading Principles in Political Economy, Newly Expounded* (1874). Though in the main an adherent of the school of J. S. Mill, Cairnes exhibited at all times an original genius and a capacity for rigid logical deduction which enabled him to restate many of the principles of Mill in a more tenable form. In respect to method, Cairnes treated political economy as almost a pure science, with little concern for the practical application of its principles. He wrote in defense of the Wage Fund

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theory, after Mill, with whom it originated, had abandoned it. Among his other contributions to the science of economics may be mentioned his keen analysis of the subject of cost in production, and of value as affected by the limits of free competition.

CAIRNGORM, kârn-gôrm′. A brown or yellow variety of quartz found in the District of Cairngorm, southwest of Banff, Scotland, whence its name. The color was formerly considered due to the presence of a small quantity of iron or manganese oxide, but it is now believed to be caused by some nitrogenous organic compound. Besides Scotland, cairngorm is found in Brazil, Siberia, Spain, and in the United States, near Pike's Peak, Colo., and in Burke and Alexander counties, N. C. The yellow variety is sometimes called 'false topaz' and 'Scotch topaz,' or 'Spanish topaz,' through its lacking the hardness and brilliancy of the true topaz. In Scotland the cairngorm is cut and used for making brooches, bracelets, pins, etc.

CAIRNS, kârnz, HUGH MACCALMONT, Earl (1819-85). A British statesman, born at Cuttra, County Down, and educated at Trinity College, Dublin. He became a member of the House of Commons for Belfast in 1852, Solicitor-General under Lord Derby in 1858, Attorney-General in 1866, and Lord Justice of the Court of Appeals in the same year. In 1868 he was Lord High Chancelor in the Disraeli Ministry. Upon the return of the Conservative Party to power, in February, 1874, he was reinstated and continued to exercise his official functions until April, 1880. In 1878 he received the title of Viscount Garmoyle, in the county of Antrim, and Earl Cairns. He was one of the finest Parliamentary orators of recent times; and several of his speeches are justly regarded as masterpieces.

CAIRNS, JOHN (1818-92). A Scottish divine. He was born at Ayton, Berwickshire, and studied at the universities of Edinburgh (1834-41) and Berlin (1843-44), and at the Presbyterian Secession Hall from 1840 until licensed. He was minister of the United Presbyterian Church, Berwick-on-Tweed, from 1845 to 1876, when he removed to Edinburgh, where, in 1879, he was appointed principal of the Theological College. Among his published writings are the following: *Life of John Brown, D.D.* (1860); *Unbelief in the Eighteenth Century* (1881); the articles "Schottland" and "Kirchliche Statistik" in the second edition of Herzog's *Realencyklopädie;* and the article "Infidelity" in the *Schaff-Herzog Encyclopædia.*

CAIRO, kī′rō (from Ar. *Masr el-Qāhira*, the victorious capital). The capital of Egypt and the largest city of Africa. It is situated near the right bank of the Nile, about nine miles above its bifurcation into the Rosetta and Damietta arms, 150 miles southeast of Alexandria and 80 miles west of Suez (Map: Egypt, E 2). It covers an area of 11 square miles divided into separate quarters named after the nationality of the inhabitants, and is surrounded by a low wall. Notwithstanding modern improvements, the Arabian quarters retain their Oriental character, the streets in that part of Cairo being narrow, crooked, and but few of them paved. The houses are mostly of stone, several stories high, and with window-lattices of wrought iron. The modern portion of Cairo, called Ismailieh, is extending westward. It is lighted by gas, has electric tramways, and is well laid out with broad avenues, fine squares, and a beautiful park on the Place Ezbekieh, occupying an area of over twenty acres and containing a number of gardens and amusement places. The Place Ezbekieh is the centre of modern Cairo, and around it are situated the principal theatres, hotels, and consulates.

The chief beauty and interest of Cairo lie in its numerous mosques, of which some are regarded as the best specimens of Arabic architecture. The Gami-ibn-Tulun, erected about 879, is the finest. It is square and surmounted by four minarets and a dome, and has a court with a fountain in the centre. The Gami Amra is the oldest in Egypt, but only a small portion of it is left. The Gami Sultan Hassan was begun in 1356, and, in point of splendor, stands foremost among the mosques of Cairo. It is cruciform in the interior, and contains a large number of pillars and beautiful hanging lamps. Its inner court has two fountains of singular beauty, and its dome is flanked by two minarets, the southern of which is said to be the highest in Egypt. Among other mosques may be mentioned that of Mehemet Ali, a structure of considerable architectural merit, recently built after Turkish models, with high minarets of alabaster. The mosque of Kait Bey dates from the Fifteenth Century. Cairo has a number of tombs of califs and Mamelukes, some of which are of great size and finely built. The obelisks, once so numerous, have disappeared, and now adorn various European and American cities. The bazaars of Cairo are extensive and well stocked, although inferior to those of Constantinople or Smyrna. The chief business street, Muski, has greatly decreased in importance. The citadel of Cairo is situated southeast of the city, and affords a fine view; its strategical importance is greatly detracted from by the fact that it is dominated by the Jebel Mokattam.

As an educational centre Cairo ranks high: its schools are attended by students from all parts of the Islamic world. Among its educational institutions the El-Azhar stands foremost, both in size and importance. It is situated in an old mosque, and is surrounded by numerous smaller buildings, used for the accommodation of the 10,000 students, of whom about 2000 live in the college. Its history can be traced as far back as 975, and it is considered the oldest university in the world. It has faculties of theology and jurisprudence, and is maintained chiefly by endowments, no tuition fee being charged.

The other educational institutions include schools of art and medicine, a veterinary and a polytechnical school, besides numerous missionary and Arab schools. The vice-regal library contains about 50,000 volumes, including a number of very rare copies of the Koran.

Cairo is the residence of the Khedive, and is the seat of administration of Egypt. It has also an international court and consular representatives from all important countries. The manufactures of Cairo include metal articles, textiles, essences of flowers, etc. There is railway communication with Alexandria, Damietta, and Suez. The population of Cairo and its suburbs was 570,062 in 1897, consisting chiefly of Turks, with some Copts, Nubians, Berbers, Abyssinians, Jews, and over 20,000 foreigners.

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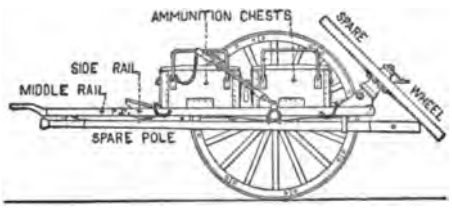
Old Cairo or Fostat was founded in 640 by Amru, the conqueror of Egypt, on the site of his camp and near the old town of Babylon. It was the capital of the country till 973, when Gauhar, the general of the Fatimite Caliph Al Moez, founded to the north of Fostat the new town of Al Kahirah, the Victorious City; Saladin enarged the boundaries of the town and surrounded it with walls. Throughout the Middle Ages Cairo was one of the chief centres of Mohammedan culture, and the emporium for the trade between Europe and the East. From 1798 to 1801 it was held by the French; it passed from them to the Turks, and through the Turks to Mehemet Ali, the founder of the present ruling dynasty. Though much of its former greatness has departed, Cairo is still one of the great capitals of Islam, and the life within its walls presents a picturesque blending of the buoyant European civilization, as represented by the English and French residents, with the dreamy mysticism of the Oriental world. Consult: Reynolds-Ball, *The City of the Caliphs* (Boston 1897); Penfield, *Present-Day Egypt* (New York, 1899); and Kemeid, *Cairo and Egypt* (London, 1899-1900).

CAIRO, kā'rō. A city, port of entry, and county-seat of Alexander County, Ill., at the junction of the Mississippi and Ohio rivers, 150 miles southeast of Saint Louis, on the Illinois Central, Cleveland, Cincinnati, Chicago and Saint Louis, and other railroads (Map: Illinois, C 6). The Ohio River is here crossed by a railroad bridge 2 miles long, and 58 feet above high water, which cost $2,500,000. Cairo has considerable manufactures, chiefly products of lumber, and has an extensive river trade, being an important market for the agricultural products of the Mississippi valley. It has a public library (A. B. Safford Memorial), a Government custom-house, and a United States marine hospital. Settled about 1837, Cairo was incorporated some 30 years later. It was expected to become a great commercial centre, and is the place described by Dickens in *Martin Chuzzlewit* as 'Eden'; but, until it was protected by levees, begun in 1857, it suffered from frequent inundations, the most disastrous of which occurred in 1858. During the Civil War large quantities of military supplies were stored here by the Federal Government. Cairo is governed under a general act of the State Legislature, passed 1872, with slight amendments since that time. The mayor, who is elected biennially, and the city council, chosen by wards, select the city marshal, tax collector, corporation counsel, health officers, policemen, etc. Other offices are filled by popular election. Population, in 1890, 10,324; in 1900, 12,566.

CAIROLI, kī'rō-lē, Benedetto (1825-89). An Italian statesman, born at Gropello, near Pavia. He was educated at the University of Pavia, which he left in 1848 to volunteer in the war against Austria, and from 1851 to 1859 lived in exile in Piedmont, when he again took up arms for Italian liberty, serving at the siege of Palermo, in the Trentino, and at Monterotondo and Mutino. Though he favored a republic, he was induced to accept the constitutional monarchy. After the accession of Humbert I. Cairoli became president of the Chamber, and was appointed Premier in March, 1878. This was the beginning of the period of personal and factional politics which have since been the bane of Italy. On November 17, as the King was driving into Naples, a certain Giovanni Passanante attempted to assassinate him with a poniard, but was prevented by Cairoli, who was in the carriage, and who received a severe wound, while King Humbert escaped with a mere scratch. In December, 1878, the Cairoli Ministry resigned. The Depretis Ministry, which succeeded, was in turn defeated in 1879 and the Left again came into power, under Cairoli, who was, however, forced to reconstruct his Cabinet the same year, and to bring in Depretis as Minister of the Interior. Finally, owing to the unpopularity of the policy pursued in regard to the French expedition to Tunis, the Ministry resigned in 1881. From that time until his death Signor Cairoli was conspicuous as a leader of the so-called 'historic' Left. Consult Lowell, *Governments and Parties in Continental Europe* (Boston, 1897).

CAISSON, kās'sŏn (Fr., augment of *caisse*, chest, Eng. case). A four-wheeled vehicle or ammunition carriage, attached to batteries of field artillery. In horse or light field batteries



U. S. FIELD-ARTILLERY CAISSON.

there is usually one caisson to each gun, and in heavy field batteries two. The ammunition is carried in three chests, two of which are mounted on the body or caisson proper, and one on the limber. On the caisson are also carried a spare wheel and such tools and supplies as would be useful in any emergency or accident likely to cause delay. The limber of the caisson is similar to that provided for gun-carriages. See Artillery; Field Artillery; Limber.

CAISSON. A floating gate with both ends alike, and resembling a short but very deep vessel, which is used to close the entrance to a dry dock. Its framing and plating resemble those of a ship, and it frequently contains a boiler and pumps for clearing it of water after being submerged. The term is also used, in a nautical sense, to designate a hollow floating structure for lifting ships. Caissons for this purpose are now generally made of steel, and are divided into compartments which can be separately connected with a pump. To operate a caisson it is first submerged to the required point, and then, having little or no buoyancy, it is drawn under the vessel to be raised or, with others, lashed to her with chains or ropes. The water is then pumped out, and the ship rises, supported by the caissons. Sectional floating docks, not now much used, consist of several caissons which are linked together to form a bed long enough to support a ship. In New York and in one or two other ports there are contrivances for lifting vessels called *screw-docks*. These consist of caissons which are sunk sufficiently to permit the vessel to pass over them. They are then emptied, and after they have lifted the vessel as far as their buoyancy permits, the caisson and vessel are raised by heavy screws in a side framework.

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The pneumatic caisson used in hydraulic engineering consists of a steel box without a lower side, but with sides and top air-tight. It rests on the bottom, into which the sharp edges of its sides are forced by pressure or weight. To further assist in keeping the water out, an adequate air-pressure is maintained in it. The men who work in the caisson enter through air-locks which have air-tight doors on each side, so that very little pressure is lost. See FOUNDATION, and DOCK.

CAISSON DISEASE. A rare affection induced by remaining for any length of time in a caisson. The disease was first described by Pol and Watelle, in 1845. The symptoms are buzzing and pain in the ears, dizziness, loss of power in the legs, severe pain in the arms, legs, and shoulders, bleeding from the nose and lungs, and occasionally unconsciousness. The cause of the disease is uncertain. According to one theory, caisson disease is due to poisoning by carbonic acid. According to another theory, it is due to congestion of the internal organs with subsequent blood-stasis, resulting in possible blocking of the blood-vessels by small thrombi, followed in turn by a necrotic process. Finally, according to a third theory, the disease is due to increased solution by the blood of the compressed gases of the air (principally nitrogen and carbonic acid) and to their rapid liberation during decompression. Judging from the careful observations made in 1891 by Van Rensselaer, the second theory is probably nearest to the truth.

In the treatment of caisson disease, morphia, heat; stimulants, strychnine, and ergot are recommended. Returning to compressed air for a time, and then emerging very slowly, has benefited many sufferers. Preventive treatment may consist in securing the removal of carbonic acid from the air in the caisson and increasing the time spent in 'locking out' to one minute for every three pounds of pressure, a sudden transition from compressed air to the pressure of the atmosphere being quite dangerous. Above all, only perfectly sound men should be selected for work in caissons. Consult: Pol and Watelle, "Mémoire sur les effets de la compression de l'Air," in *Annales d'hygiène publique et de médecine légale* (Paris, 1884); Oertel, "Handbuch der respiratorischen Therapie," in Ziemssen, *Handbuch der allgemeinen Therapie*, Band 1, Theil 4 (Leipzig, 1882); Smith, *The Physiological, Pathological, and Therapeutic Effects of Compressed Air* (Detroit, Mich., 1886); and Lloyd, "Effects of Compressed Air," in *Twentieth Century Practice*, Vol. III. (New York, 1895). See FOUNDATION.

CAITHNESS, kāth'nĕs. The northernmost county of Scotland. Its area is 686 square miles (Map: Scotland, E 1). The general aspect of Caithness is level and bare, it being in great part moorland and destitute of trees, while the seacoast is bold and rocky, with many bays, inlets, promontories, and caves. The chief crops are oats, barley, turnips, and potatoes. The occupants of the small farms divide their time between farming and herring, ling, cod, salmon, and lobster fishing. Wick, the county town, is the chief seat of the British herring fishery. Population, in 1801, 22,600; in 1851, 38,700; in 1891, 37,177; in 1901, 33,860.

CAITHNESS FLAGSTONE. A dark-colored bituminous schist, slightly micaceous and calcareous, valuable on account of its toughness and durability for pavements, cisterns, and various other purposes. Flagstones of this material are largely exported. They belong to the Devonian Old Red Sandstone, and contain abundant remains of fossil fishes. See DEVONIAN and OLD RED SANDSTONE.

CA'IUS. The name assumed by Kent in Shakespeare's *King Lear*.

CAIUS, DOCTOR. A French physician in Shakespeare's *Merry Wives of Windsor*. He is in love with Anne Page, and elopes with a boy disguised in her clothes.

CAIUS, kēz, JOHN (1510-73). An English physician, the co-founder of Gonville and Caius College, Cambridge. His real name was Kay or Kaye, which he Latinized into Caius. He was born in Norwich, was educated at Gonville Hall, Cambridge, and, in medicine, at the University of Padua and elsewhere on the Continent, spending much time in search of accurate texts of Galen and Hippocrates. On his return he practiced with success at Cambridge, Shrewsbury, and Norwich. In 1547 he was elected a fellow of the College of Physicians, of which he was afterwards nine times elected president. He also became physician to Edward VI., Queen Mary, and Queen Elizabeth. He acquired much wealth from the practice of his profession and employed it in the encouragement of science and learning. In 1557 he refounded Gonville Hall, thereafter known as Gonville and Caius College. In 1559 he was chosen master, and, although he was a Roman Catholic, he retained the office under Elizabeth. His books number twenty-seven titles, including critical, antiquarian, and scientific works, the most famous of which is *A Boke of Counseill Against the Sweat and Sweatyng Sickness* (1552).

CAIUS COLLEGE. See GONVILLE AND CAIUS COLLEGE.

CA'IUS GRAC'CHUS. A tragedy by J. Sheridan Knowles, published in 1815 and produced at the Belfast Theatre, on February 13 of that year. Macready brought out a remodeled version on November 18, 1823, at Covent Garden.

CAIVANO, kī-vä'nō. A city in south Italy, five miles north of Naples, with which it is connected by a street railway (Map: Italy, J 7). The chief trade is in the grain, hemp, fruit, wine, and olives that grow in the vicinity. It was a place of considerable strength in the Middle Ages, and still retains remains of walls and towers. Population (commune), in 1881, 12,000; in 1901, 12,264.

CAIX, kä-ēks', NAPOLEON (1845—). An Italian philologist. He was born at Bozzolo, near Mantua, and was educated in Cremona and Pisa. In 1869 he became professor of ancient languages at the Lyceum of Parma, and in 1873 professor of Romanic languages and comparative philology at the Institute of Higher Studies, Florence. The following are some of his numerous publications: *Saggio sulla storia della lingua e dei dialetti d'Italia* (1872); *Sulla lingua del contrasto* (1876); *Le origini della lingua poetica italiana* (1880), which work is generally considered his best.

CAJAMARCA, kä'hä-mär'kä. An interior department of Peru, in the northwestern part of the republic (Map: Peru, B 5). It has an area

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of 12,538 square miles, comprising a highly mountainous district which belongs to the basin of the river Marañon. Population, in 1896, 442,412. The department is noted rather for mineral wealth—principally gold, silver, copper, iron, and coal—than for animal or vegetable life. Cajamarca until 1854 formed part of the Department of Libertad.

CAJAMARCA, or **CAXAMARCA,** kä'hä-mär'kä (Quichua *ceassac, casac,* frost, ice + *marca,* place, town, referring to its severe climate). A city of Peru, capital of the department of the same name, situated on the east slope of the Andes, at an elevation of about 9000 feet above sea-level; 84 miles from the Pacific coast and 310 miles north by west of Lima (Map: Peru, B 5). It enjoys a moderate temperature; is laid out with broad streets crossing at right angles; and contains several plazas. There are two fine churches, secondary colleges for both sexes, a prison of modern construction, and the ruins of the palace of Astopilco, where Atahualpa, the last of the Incas, was killed in 1533 by Pizarro. Cajamarca is one of the oldest cities of Peru, and figured prominently at the time of the Spanish Conquest. Three miles to the east are hot sulphur springs known as the Incas' baths. The most important manufactures are steel articles, cotton and woolen goods, and straw hats. Population, about 12,000.

CAJ'EPUT (Malay *kāyā,* tree + *putih,* white), *Melaleuca leucadendron.* A tree of the order Myrtaceæ, from the leaves of which the pungent, aromatic, volatile oil called oil of cajeput is obtained by distillation. The cajeputtree occurs from the Malay Peninsula to Australia, and is a tree 30 to 40 feet high and 2 feet in diameter, with a crooked trunk, papery bark, white wood (whence the name, cajeput), elliptical, lanceolate, alternate leaves, and terminal spikes of white flowers. The greater number of the species are natives of Australia, where more than a dozen well-marked species are known, some of them very beautiful shrubs and frequent ornaments of British hothouses. Much of the oil of cajeput of commerce is prepared from Melaleuca leucadendron, but volatile oils similar in many respects are distilled from the leaves of many other species. A hundred pounds of leaves yield slightly less than one pound of oil. It is maintained by some that the true oil of cajeput comes only from Melaleuca minor, but that species cannot be distinguished botanically from Melaleuca leucadendron. The oil contains a number of complex constitutents, as cajeputol, hydrocarbons, various ethers, etc. It is a stimulant, counter-irritant, diaphoretic, and antiseptic. In India it is used extensively as an external application for rheumatism. The oil is rather heavy, and usually is of a greenish tinge. The wood is hard, close-grained, and durable, especially when placed under ground. The bark is useful for packing, etc. In Australia these trees are known as tea-trees. Melaleuca axillaris produces a thin, spongy bark, that can be used for blotting and filter paper.

CAJ'ETAN (Lat. *Cajetanus*) (1469-1534). An Italian ecclesiastic, whose real name was Jacopo de Vio (in religion Tomaso), the name Cajetan being assumed by him from his birthplace Gaeta (Cajeta). At the age of 15 he entered the Dominican Order, studied for the next few years at Naples, Padua, and Ferrara (where he held his own in a public disputation with Pico della Mirandola), and in 1508 became general of his order. Leo X. made him a cardinal in 1517, and in the following year sent him to Germany to urge the Emperor and the Scandinavian kings to form a league against the Turks. While on this errand he was commissioned to examine Luther personally, and send him to Rome if need were. Luther appeared before him at Augsburg, but refused to retract his teaching on indulgences, and his breach with the Church was only widened by the discussion. In 1523 Cajetan was sent as legate to Hungary; but Clement VII., on his accession, recalled him to Rome, in order to make use of his theological knowledge and counsel. He was consulted on the divorce of Henry VIII., and decided unhesitatingly against it. He made a translation of the Old Testament, with a commentary, and wrote a treatise on the authority of the Pope, which was answered by the faculty of the University of Paris. He also wrote commentaries upon parts of Aristotle's writings, and upon the *Summa* of Aquinas. The latter is reprinted in the definitive edition of the great Aquinas issued under the patronage of Leo XIII. (Rome, 1882) (q.v.). He died in Rome, August 9, 1534. A collection of his works appeared at Lyons in 1639 (5 vols.); his life is prefixed. Consult, also, Schilbach, *De Vita ac Scriptis de Vio Cajetani* (Berlin, 1881).

CAJIGAL, kä'hē-gäl', FRANCISCO ANTONIO (1695-1777). A Spanish colonial governor, born in Santander, Spain. He was Governor of Santiago, Cuba, from 1738 to 1747, and in 1742, during the war between Spain and England, repelled an attack of Admiral Vernon (q.v.). In 1747 he was appointed Governor-General of Cuba, which position he held until 1760, establishing a navy-yard and arsenal at Havana during his term of office. From 1700 to 1761 he was a viceroy of Mexico *ad interim,* and afterwards, until his death, lived in Spain.

CAKCHIQUEL, käk'chē-käl'. An important tribe or nation, of Mayan stock, formerly holding the central districts of Guatemala, where their descendants still reside. The name is that of a native tree, and their language is a dialect of the Quiche. At the time of their conquest by Alvarado, about 1524, they had attained a high degree of culture, as is evidenced by their architectural remains, their calendar and hieroglyphic systems, and their native literary productions. They had an intense religious veneration for maize, and there is even reason to suppose that they were the first people to reclaim it from its original wild condition. The best compendium of their history and culture is Brinton's *Annals of the Cakchiquels.*

CAKES, THE LAND OF. A title applied to Scotland, on account of the baps, scones, and oatmeal cakes which, with porridge, form the principal food of the country people. The epithet was prevalent in the Eighteenth Century.

CAKE-URCHIN. See SAND-DOLLAR, and SEA-URCHIN.

CAL'ABAR (OLD) RIVER. An estuary-like bay on the north side of the Bight of Biafra, which penetrates British Nigeria just west

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of the border line between it and Kamerun (Map: Congo Free State, A 2). It is about 10 miles wide, and extends inland nearly 25 miles. Near the head of the bay the waters of three rivers—the Cross, the Calabar, and the Akpa—are received through a deltoid border-land. The chief towns bordering the delta and estuary are Old Calabar, Duketown, and Creektown. The name Old Calabar is also applied to the region around the river, and now incorporated with British Nigeria.

CALABAR BEAN. The seed of *Physostigma venenosum*, a twining, half-shrubby plant, native of western Africa, of the natural order Leguminosæ, nearly allied to the kidney-bean, but of a genus distinguished by the hood-shaped stigma and the deeply furrowed hilum of the seed. The following are the leading characters of the bean itself: "About the size of a very large horse-bean, with a very firm, hard, brittle, shining integument, of a brownish-red, pale-chocolate, or ash-gray color. Irregularly kidney-shaped, with two flat sides, and a furrow running longitudinally along its convex margin, ending in an aperture near one end of the seed. Within the shell is a kernel, consisting of two cotyledons, weighing on an average about 46 grains, hard, white, and pulverizable, of a taste like that of the ordinary edible leguminous seeds, without bitterness, acrimony, or aromatic flavor. It yields its virtues to alcohol, and imperfectly to water." It is used in the form of an emulsion by the natives of Africa, as an ordeal when persons are suspected of witchcraft. It is believed that if one vomits them he is innocent; if they are retained and death occurs, he is guilty. If the accused person is innocent he will usually eat a large number without hesitation, and so cause vomiting; if he hesitates and takes little, this does not occur. In 1855 Dr. Christian very nearly fell a victim to his zeal for science in experimenting on some specimens of this bean which had been sent to Edinburgh by some African missionaries, dangerous symptoms having been produced by 12 grains of the kernel which he swallowed. In 1861 Dr. Thomas R. Fraser tried the effects upon himself of doses of 6, 8, and 10 grains. The general symptoms were epigastric uneasiness, great feebleness, dimness of vision, salivation, giddiness, and irregular, feeble, and slow heart's action. When placed on the eyeball, this substance contracts the pupil, decreases intraocular tension, and produces near-sightedness. In 1864 fifty children were poisoned by eating these beans, which were swept out of a ship at Liverpool. A boy aged 6 years, who ate six beans, died very speedily. The chief symptoms in these cases were griping, vomiting, and contracted pupils; the face was pale, the eyes bright and protruding, and in trying to walk the children staggered as if they were drunk. The bean contains two alkaloids—physostigmine, or eserine, which represents the chief activity of the drug; and calabarine, which has a tetanizing action like strychnine. It has been used medicinally, in small doses, in chorea, tetanus, and strychnine poisoning. It is employed to counteract the dilatation of the pupil caused by atropine, to lessen intraocular tension in glaucoma, and to alternate with atropine in breaking up adhesions in iritis. Being now a recognized medicinal agent, it is satisfactory to know that the dangerous and even fatal effects of excessive doses may be prevented by administering belladonna (nightshade), or its active principle, atropine. Belladonna has also an opposite action on the eye to that of this substance. When the pupil is contracted by Calabar bean, it may be dilated to its normal size or larger by belladonna; and when it is dilated by belladonna, it may be reduced to its normal size or smaller by Calabar bean; but the action of eserine is not as durable as that of atropine.

CALABASH GOURD (Fr. *calebasse*, Sp. *calabaza*, a dry gourd; cf. Pers. *kharbuz*, melon, Little Russ. *harbuz*, pumpkin, watermelon), or BOTTLE GOURD (*Lagenaria vulgaris*). A climbing annual plant of the natural order Cucurbitaceæ, cultivated in tropical countries. The angular leaves and the thin stem of the plant feel sticky to the touch, and have a disagreeable odor. The odor of the white flowers resembles that of musk. The hard rind of the bottle-shaped fruit, called calabash, is much used in tropical countries for holding liquids. The pulp of the common bottle gourd is worthless, and cannot be used as an article of food. Other varieties of Lagenaria, however, bear an edible fruit, which is sometimes sweetened with sugar and offered for sale. For illustration, see Plate under CUCUMBERS.

CALABASH-TREE (*Crescentia cujete*). An evergreen tree found in the West Indies and in the tropical parts of America, belonging to the order Bignoniaceæ. In height and size it resembles an apple-tree, and has broad, lanceolate leaves, tapering to the base; large, whitish, fleshy flowers scattered over the trunk and older branches; and a gourd-like fruit, sometimes a foot in diameter. The wood of the tree is tough and flexible, and is well adapted for coach-making. The most useful part is the hard shell of the fruit, after the outer skin is removed. Under the name of calabash, it is much used, in place of bottles, for holding liquids, and for goblets, cups, water-cans, etc. These shells may even be used as kettles for boiling liquids. They are sometimes highly polished, carved with figures, tinged with various colors, and converted into ornamental vessels. The rinds of gourds are sometimes similarly used, and called calabashes.

CALABAZAR, kä'lä-bä-thär'. An inland city of Cuba, in the Province of Santa Clara, about 20 miles north by east of Santa Clara. It has a fine parish church and a pretentious municipal building. Population, in 1899, 1575; municipal district, 13,419.

CALABOZO, kä'lä-bō'sō (Sp., dungeon). A town in Venezuela, capital of the State of Guárico, about 120 miles south-southwest of Caracas (Map: Venezuela, D 2). It is situated on the Guárico River, in the fertile grazing region of the great plains, and is an important commercial centre, with a trade in live stock, hides, cheese, timber, etc. Calabozo is the see of a bishop. The climate in this vicinity is excessively hot, and inundations are not infrequent. Calabozo was a humble native village until the early years of the Eighteenth Century, having been founded in 1730. Population, about 6000.

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CALABASH, ETC.

1. CASTOR OIL PLANT (Ricinus communis).
2. CEDAR OF LEBANON, CONE AND FOLIAGE (Cedrus Libani).
3. CALABASH TREE (Crescentia cujete).
4. FRUIT OF CALABASH TREE.
5. CATALPA OR INDIAN BEAN TREE (Catalpa bignonioides).
5a. CATALPA FRUIT OR INDIAN BEAN.

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CALA'BRIA (Gk. Καλαβρία, *Kalabria*). The southernmost peninsula of Italy, having the Ionian Sea and the Gulf of Tarento on the east, and the Tyrrhenian Sea on the west (Map: Italy, J 8). Its area is 5819 square miles. The surface is very mountainous, the peninsula being traversed through its entire length by the Apennine Mountains. Owing to its elevated surface, Calabria has a moderate and healthful climate. The flora is extremely rich and varied. The mountain slopes are covered with extensive forests of pine, oak, beech, and numerous other trees, interspersed with vineyards and olive gardens. Grain, rice, southern fruit, hemp, and flax are raised and exported in considerable quantities, and the raising of domestic animals is extensively engaged in by the inhabitants. Of mineral products, Calabria yields marble, alabaster, gypsum, salt, and some copper. The province is purely agricultural, the manufacturing industries being only slightly represented. There are very few large towns, and the railway lines run chiefly along the coast. For administrative purposes, Calabria is divided into the three provinces of Catanzaro, Cosenza, and Reggio di Calabria, with a total population of 1,366,982 in 1900. The Calabrians are mostly plain folk, quite superstitious, and generally ignorant.

In Roman times the name Calabria was given to the southeastern peninsula of Italy, nearly corresponding to the modern Province of Lecce, no portion of which is included in modern Calabria, which answers to the ancient Bruttium. The name Calabria, as applied to the district now known by that name, appears to have originated with the Byzantines some time prior to the conquest of the country by the Normans. Before the unification of Italy Calabria constituted a province of the Kingdom of the Two Sicilies.

CALA'DIUM (Neo-Lat.; possibly from Scotch *kale, kail*, cabbage—a variant of *cole*). A genus of aroid plants related to Arum. There are about a dozen species, and numerous varieties that are cultivated in hothouses for their large, beautifully variegated, arrow-shaped leaves. They are closely allied to the Colocasias, which, in addition to being highly ornamental bedding plants, furnish the Taro (q.v.) of the Pacific islands. See ELEPHANT'S-EAR.

CALÁGANE, kä-lä'gä-nä. A Malayan people on Dávao Bay, Mindanao. See PHILIPPINES.

CA'LAH. An Assyrian city mentioned in Gen. x. 12, and no doubt identical with Kalchu, which frequently occurs in the Assyrian inscriptions as the name of an important city. According to Ashurnazirpal (B.C. 885-60), Calah was built by Shalmaneser I. (c.1250). It was rebuilt by Ashurnazirpal in B.C. 880. He adorned it with a massive wall on the northern side, beautiful gardens along the banks of the Tigris, lofty temples, and huge palaces. In one of these palaces was found the 'black obelisk,' recording the tribute paid by "Jehu, the son of Omri," to Shalmaneser II. (860-25). Building operations were carried on in Calah by Shalmaneser I., Ashurnazirpal, Shalmaneser II., Tigrathpileser III. (745-28), Sargon (722-05), Esarhaddon (681-68), and Ashar-itil-ilani-ukin (626-?). The largest zikkurat was 167 feet square and 140 feet high, and had seven stages. During a number of reigns Calah was the residence of the Court, but in population it probably never equaled Nineveh, or even Ashur. It was the city that Layard discovered at Nimrud, 20 miles south of Kayunjik, when he supposed that he had found Nineveh. Since no tablets have been found at Nimrud, it has been assumed that Sennacherib (705-681) removed the temple library to Nineveh. Consult: Layard, *Nineveh and Its Remains* (London, 1875); G. Smith, *Assyrian Discoveries* (London, 1875); id., *Chaldean Account of Genesis* (London, 1875); Winckler, *Geschichte Babyloniens und Assyriens* (Leipzig, 1892); Rogers, *History of Babylonia and Assyria* (New York, 1901).

CALAHORRA, kä'lä-ōr'rä (anciently, Lat. *Calagurris*, later *Kalatharral* of the Saracens, from Ar. *Kalat*, castle, and *harral*, stone). A town of Spain, in the Province of Logroño, Old Castilo, 24 miles southeast of the city of Logroño, situated on the small river Cidacos, about 2 miles from its confluence with the Ebro (Map: Spain, D 1). It is the seat of a bishopric, and the cathedral is the principal building. The town has a brisk trade in local agricultural products. Population, in 1897, 9500. Calahorra occupies the site of the ancient Calagurris, celebrated in classic history for the obstinate but unsuccessful resistance it offered (B.C. 78) to Afranius, Pompey's legate, when the citizens slaughtered their wives and children for food rather than surrender. Calahorra was the birthplace of Quintilian, the rhetorician.

CALAIS, kăl'ĭs. A city and port of entry in Washington County, Maine, 120 miles east by north of Bangor, on the Saint Croix River, at the head of tidewater, and opposite Saint Stephen in New Brunswick (Map: Maine, J 5). The most northeasterly seaport in the United States, it is the terminus of the Saint Croix and Penobscot Railroad, and has railroad communication also by the Canadian Pacific through Saint Stephen, with which it is connected by an international bridge. The river furnishes abundant water-power, to which is due the great lumber trade of the city. Ship-building is also an important industry, and there are foundries, machine shops, marble and granite quarries, and manufactures of shoes, calcined plaster, woolen goods, etc. The city contains a public library of 7500 volumes, Calais Academy, and Memorial Park. Pierre du Guast, Sieur de Monts, who in 1605 founded at Port Royal the first French settlement in Canada, spent the winter of 1604-05 on Big Island, within the present city limits. Calais was settled in 1779, incorporated as a town in 1809, and chartered as a city in 1850. It was nearly destroyed by fire in August, 1870. The government is administered under a charter of 1883 (revised 1901), which provides for a mayor, elected annually, and a city council, which elects heads of all departments. Population, in 1890, 7290; in 1900, 7655. See I. C. Knowlton, *Annals of Calais* (Calais, 1875).

CALAIS, kä'lä' (Med. Lat. *Calailia, Calaisis*). A seaport town and fortress of the first class in the Department of Pas-de-Calais, France, on the Strait of Dover, near its narrowest part, the distance from the town of Dover, England, not being more than 18 miles (Map: France, H 1). On the south and east, low, marshy grounds, which can be laid under water for the defense of

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the city, extend almost to the walls. The town, adjacent country, and port are commanded by the citadel, which is situated at the west end of the town, while seven forts, by their cross-fire, defend the weakest points. The harbor, which was formerly shallow, has been greatly improved, has a light-house 190 feet high, and a port accessible to the largest vessels. As one of the chief ports of debarkation for travelers from England to France, it has frequent steam communication with Dover and London. The city is square in form; its streets are, for the most part, broad and well paved; and its ramparts form pleasant promenades. Among its objects of interest, the most noticeable are the Church of Notre Dame, the old Hôtel de Ville, and the Hôtel de Guise. It has become a manufacturing town of some importance. The chief manufactures are bobbinnet (tulle), machine-made lace, hosiery, etc. A number of mills produce silk, wool, cotton, and linen goods, and hats and gloves are extensively made. Calais has also distilleries, salt-refineries, and shipyards. Calais sends numerous boats to the herring and cod fisheries on the coasts of Scotland and Iceland. Its exports consist of eggs, corn, wine, brandy, etc., and it is the entrepôt for the produce of the district. It also does a large business in petroleum. In 1873 a school of artillery was established in Calais. It has an abundant water-supply, brought from the neighborhood of Guines. Population, in 1896, 56,940.

In the Ninth Century Calais was a small fishing village. In the following century it was much improved by Baldwin IV., Count of Flanders, and enlarged and strengthened by the Count of Boulogne. In 1347, after a long siege, it was captured by Edward III. of England, whose hard terms, and the self-devotion shown by six of the citizens, who were saved by Queen Philippa, form one of the most interesting passages of history. The English retained it until 1558, when it was captured by the Duke of Guise, since which time (with the exception of two years, 1596-98, when it was in the possession of the Spaniards) it has remained in French hands. Consult: Calton, *Annals and Legends of Calais* (London, 1852); P. W. T., "Modern Calais," in *Nautical Magazine*, Vol. LXVII. (London, 1898).

CAL'AÏS and **ZETES**, zē'tēz. In Roman mythology, the two winged sons of Boreas. They took part in the Argonautic expedition, during which they rescued the blind King Phineus from the attacks of the Harpies. They were said to have been slain by Hercules on the island of Tenos, where their graves were shown.

CAL'AMAN'DER WOOD. See EBONY.

CAL'AMARY (Neo-Lat. *calamarius*, from Lat. *calamus*, reed, pen). An Anglicized form of a European name for certain squids, given in allusion to the feather-pen-like internal shell, often called a calamary. Pen-and-ink fish is another and similar name. See SQUID.

CALAMATTA, kä'lä-mät'tä, LUIGI (1802-69). An Italian engraver. He was educated in Rome, but spent much time in Paris. In 1837 the Belgian Government commissioned him to found and direct a school of engravers in Brussels, where he had such pupils as Gustave Biot and Leopold Flameng. He is best known, perhaps, by the engraving of the head of Napoleon. Among his numerous works are engravings of Ary Scheffer's "Francesca da Rimini;" "La Gioconda," after Leonardo da Vinci; a portrait of George Sand, from life; and the "Madonna della Sedia" of Raphael. He spent his last years as professor of drawing in the Academy of Milan. His engravings are remarkable for correctness and exquisite finish.

CALAMBA, kä-läm'bä. A town of Luzon, Philippines, in the Province of Laguna. It is 27 miles west of Santa Cruz, and is connected by roads with several towns of the province. It has a telegraph station. Population, in 1898, 11,459.

CALAMBUCO, kä'läm-boo'kô (Sp., probably from Pers. *kalambak*, fragrant wood). A tree found in the northern part of the island of Luzon, and considered superior to teak or live oak for ship-building. It is dark and hard, like teak, and is proof against the destructive white ant of the Malay region. Warlike, mechanical, and agricultural tools and implements are made from it. The aloes-wood is produced by *Aquilaria agallocha*, a large tree with heavy wood shaded with green. It is aromatic, and is burned as incense. Diseased specimens of this and another species are said to yield the eagle-wood. It is possible that calambuco is a product of the same or related species.

CALAME, kä'läm', ALEXANDRE (1810-64). A Swiss landscape painter. He was born in Vevey, and studied in Geneva with Diday, whose successor as head-master of the art school he afterwards became. In 1842 he exhibited in Paris the pictures entitled, "Mont Blanc;" "Jungfrau;" "Lake of Brienz;" and "Pass of Monte Rosa" (now in the Leipzig Gallery). He settled in Geneva, where he lived until 1863, and where a monument was dedicated to his memory, April 3, 1880. He was one of the best landscape painters of his day, and the best depicter of Alpine scenery. Besides the pictures already mentioned, and his numerous fine lithographs and etchings, Calame produced the following works: "Bernese Oberland" (Leipzig Gallery); "Pass of Monte Cervino" (ib.); "Ruins of Pæstum" (ib.); "Schreckhorn" (Basel Museum); "Wetterhorn" (ib.); "Waterfall Near Meiringen" (Berne Gallery); "Lake of Lucerne" (Berlin Museum); "The Four Seasons" (Geneva Museum); "The Four Divisions of the Day" (Basel Museum); "Lake of the Four Cantons" (ib.).

CALAMIANES, kä-läm'mē-ä'näs. A group of islands in the western part of the Philippine Archipelago, in latitude 12° N. and longitude 120° E., situated between the islands of Mindoro (from which it is separated by Mindoro Strait) and Palawan (Map: Philippine Islands, D 7). The principal islands are Busuanga and Calamian. They are all hilly more or less, but have a very fertile soil, yielding tropical fruits in abundance. There are some gold and iron deposits. The climate is hot and unhealthful. During the Spanish régime the Calamianes, together with the Cuyos group and the northern part of Palawan, formed the Province of Calamianes, with an area of 340 square miles and a population of 20,000.

CALAMIANO, kä-läm'mē-ä'nô. A Visayan dialect mixed with Tagalog, spoken in northern Palawan and the Calamianes Islands. See PHILIPPINES.

CAL'AMINE (Fr., from Mod. Lat. *calamina*, corrupted from Lat. *cadmia*,

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silicate that crystallizes in the orthorhombic system. The name was originally applied to mineral zinc carbonate, but this is now known as *smithsonite*, while *calamine* is restricted exclusively to the silicate. It occurs massive or crystalline, often in mammillary, botryoidal, and fibrous forms, generally white, although sometimes with a bluish or greenish shade, and less frequently yellowish to brown. Calamine is found in Germany, Austria, in Derbyshire, England, and at various localities in New Jersey, Pennsylvania, and elsewhere in the United States. When pure it contains 52 per cent. of zinc, and is therefore a valuable ore of that metal.

CALAMINT (Lat. *calaminthe*, Gk. καλαμίνθη, *kalaminthē*, from καλός, *kalos*, beautiful + μίνθη, *minthē*, mint), *Calamintha*. A genus of plants of the order Labiatæ, nearly allied to balm (Melissa). The common calamint (*Calamintha officinalis*) is not infrequent in England. It has whorls of flowers on forked, many-flowered stalks, and crenate leaves with an agreeable aromatic odor. It is used to make herb tea, and as a pectoral medicine. A number of species to which similar virtues are attributed are found in the United States. Two or three species of shrubby calamints are sometimes planted in borders of flower-gardens. See BALM.

CAL'AMIS (Gk. Κάλαμις, *Kalamis*). A sculptor of Greece, who flourished in the second quarter of the Fifth Century B.C. His works were widely scattered throughout Greece, but nothing definite is known as to the course of his life. He may be regarded as the representative artist of the transition period between the archaic art before the Persian wars and the art of Phidias. No works of Calamis have come down to us, though attempts have been made to identify several pre-Phidian types with some of his celebrated works.

CALAMITES, kăl'ă-mī'tēz (Gk. καλαμίτης, *calamitēs*, reed-like, from κάλαμος, *kalamos*, reed). A genus of fossil plants, appearing first in the Devonian rocks, and rising through the intermediate formations to the Jurassic, where it is represented by a single species. They reach their maximum development in the coal-measures, where a large number of species have been determined. The tall, straight stems rose from a swampy clay soil in profusion in the forests of sigillaria, and formed a striking and characteristic feature of the coal flora, though they supplied little material for the structure of coal. They are hollow-jointed cylinders, with longitudinal furrows, giving the fossil the appearance of equiseta. From this resemblance, botanists have generally considered them as huge 'horse-tails.' They belong to the equiseta, and the study of many specimens, both macroscopically and microscopically, has developed a number of sub-genera. The modern 'horse-tail rush' represents, according to Seward, a degenerate type of the calamitean group. Hooker was unable to detect any traces of structure, in carefully prepared specimens, or the presence of those siliceous stomata which characterize equiseta, and which should have been preserved in the fossil state; but later investigators have been more successful in finding specimens from which internal structures could be determined. Fleming has shown that the furrows are marks of a calamites trunk would show rings of scars ings on the interior cavity. The lower portion where branches had fallen off, while higher up the younger branches contained whorls of slender leaves and long, slender cones. The root termination was conical, the joints increasing upward in size and length. The foliage of calamites has been described under different names. *Asterophyllites* includes jointed and fluted stems, with branches proceeding from the joints, and bearing long, pointed leaves. *Annularia* has closely arranged leaves, while in *Sphenophyllum* the leaves were wedge-shaped. See COAL; CARBONIFEROUS SYSTEM.

CALAMITIES OF AUTHORS, THE. See DISRAELI, ISAAC.

CAL'AMUS. See RATTAN, and DRAGON'S-BLOOD.

CALAMUS (Lat., Gk. κάλαμος, *kalamos*, reed; cf. AS. *healm*, Engl. *haulm*). A word applied not only to the reed, but also to objects made from it, and especially to the ancient pen, which was commonly a split reed. Egypt furnished most of these reeds, though those from Cnidus were also highly esteemed. They were trimmed and split with a knife like a quill pen, and were generally kept in a case. Imitations of the reed pens in bronze have been found. Reed pens are still used in the East, the Arabic word being *Kalâm*. The same name is also applied to the reed pipe, or pastoral flute. See SYRINX.

CALAMUS. A name sometimes given to the sweet flag (*Acorus calamus*). See ACORUS.

CAL'AMY, EDMUND (1600-66). An English divine. He was born at Walbrook, February, 1600; studied at Pembroke Hall, Cambridge, where he attached himself to the Calvinistic party; and afterwards became domestic chaplain to the Bishop of Ely. In 1826 he was appointed lecturer at Bury Saint Edmunds, but resigned his office in 1636, when the order to read the *Book of Sports* began to be enforced. In 1639 he was chosen minister of Saint Mary, Aldermanbury, London. He now entered warmly into the controversies of the time, and became noted as a leading man on the side of the Presbyterians. He had a principal share in the composition of *Smectymnuus*, a work intended as a reply to Bishop Hall's *Episcopacie by Divine Right* (London, 1640), and one of the most able and popular polemics of the day. Like the mass of the Presbyterian clergy, he was monarchical and not republican in his political opinions. He disapproved, therefore, of the execution of Charles, and the Protectorate of Cromwell, and did not hesitate to avow his attachment to the royal cause. He was one of the deputies appointed to meet Charles II. in Holland and congratulate him on his restoration. His services were recognized by the offer of a bishopric, which he refused from conscientious scruples. He took part in the Savoy Conference (1661), but was ejected from his living by the Uniformity Act (1662); for venturing to preach in his church (December 28, 1662), he was cast into prison, but Charles II. secured his release. He died in London October 29, 1666. Two of his sons were educated for a religious profession; the one, Rev. Dr. Benjamin Calamy, became a High Churchman, and wrote *A Discourse About a Scrupulous Conscience;* the other, Edmund Calamy, was ejected for non-conformity, and had a son, also named Edmund

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(1671-1732), who acquired reputation as the biographer of the ejected clergy. He was born in London, April 5, 1671, educated among the Dissenters and in Holland (1688-91); was pastor in London, 1692, and died there June 3, 1732. He was held in high regard, and his *Nonconformists' Memorial* (1778), as it is now called, a book which underwent important changes while in the author's hands, is the best source of knowledge respecting the 2000 ministers ejected from the Church of England by the Act of Conformity. Consult Palmer, *Abridgment of Nonconformists' Memorial* (London, 1802-03), and his autobiography, *Historical Account of My Own Life* (London, 1830).

CALANCHA, kä-län'chä, ANTONIO DE LA (1584-1654). A Peruvian chronicler. Early in life he entered the Augustinian Order at Lima, and afterwards traveled extensively through Peru for the purpose of examining the ancient ruins of that country and of recording its traditions. As a chronicler of the Augustins at Lima he wrote the important history (completed in 1633), which has been translated into French, under the title *Histoire de l'église du Pérou aux antipodes et d'un grand progrès de l'église en la conversion de Gentils par la prédication des religieux ermites de l'ordre Saint-Augustin* (1653).

CAL'AND, or **KALAND**. A brotherhood of Roman Catholics devoted to charitable and devotional works, dating from the Thirteenth Century, and of considerable extent in Germany, Switzerland, and France. It degenerated so far that it was suppressed before the Reformation, its property being confiscated for public purposes.

CALANDO, kä-län'dô (It., slackening, from *calare*, to lower, diminish, decrease). A musical term which means diminishing by degrees in power (from forte to piano) as well as in rapidity, thus combining both the *decrescendo* or *diminuendo* (q.v.) and *ritardando* (q.v.) effects, but in a somewhat slighter degree.

CALANDRA, kä-län'drą, GIOVANNI BATTISTA (1586-c.1648). An Italian mosaicist, born in Vercelli. During the Pontificate of Urban VIII. it was discovered that dampness had begun to affect the paintings in Saint Peter's. It was considered advisable to replace certain of the pictures by copies in mosaic, and Calandra was the first to employ this art, afterwards brought to a much greater perfection by Christofori. He copied the "Saint Michael" of Cesari d'Arpino, and the four doctors of the Church by d'Arpino, Sacchi, Romanelli, and others.

CALANDRELLI, kä'lân-drĕl'lê, ALEXANDER (1834—). A German sculptor, born in Berlin. He studied at the academy in that city in 1847, and afterwards took a course with Friedrich Drake and August Fischer. His important works are decorative designs for the city hall of Berlin; a bronze relief, typifying the Danish War ("Statue of Victory", ib.); "Monument of Victory" (fifth municipal district, ib.); a marble statue of Cornelius, entrance-hall of Berlin Museum); an equestrian statue of Frederick William IV. (entrance to National Gallery, Berlin); an equestrian statue of Emperor William I. (Bromberg); a statue of the Elector Frederick I. (Siegesallee, Berlin).

CALANDRINO, kä'lân-drē'nô. An unfortunate character in Boccaccio's *Decameron*, the story of whose mishaps creates great amusement.

CALANDRONE, kä'lân-drō'nâ (It.). A small variety of clarinet used by the Italian peasants, on which they play simple melodies, and also sometimes accompany their national songs. It has the holes of the common flute, but the intonation is produced as in the common pipe.

CALAN'THA. The heroine of Ford's *Broken Heart*, daughter of King Amyclos of Laconia. She dies suddenly after being told of the deaths of all whom she holds dear. The scene of the announcement is a ballroom, and the episode has been strongly condemned by Hazlitt as 'unnatural.'

CAL'ANUS (Gk. Κάλανος, *Kalanos*, from Skt. *kalyāṇa*, 'the fortunate'). A Hindu philosopher, apparently a Brahman ascetic, whose real name, according to Plutarch, was Sphines. He was for some time in the camp of Alexander the Great at the invitation of the conqueror, but having become seriously ill, he was burned alive at his own request at Persepolis.

CALAPAN, kä'lâ-pän'. The capital of the island of Mindoro, Philippines, situated at the northeastern extremity of the island. It has a harbor and a fort. Population, in 1898, 5585.

CALAPE, kä-lä'pâ. A town of Bohol, Philippines, situated on the western coast, 26 miles north of Tagbilaran. Population, in 1898, 10,000.

CALAS, kä'lâs' *or* kä'lâ', JEAN (1698-1762). A Protestant merchant of Toulouse, whose judicial murder was the cause of an agitation in which Voltaire took the leading part. It resulted in the amelioration of the legal position of Protestants in France, and particularly discredited the administration of justice under the declining monarchy. Calas was accused of murdering his son because he wished to become a Roman Catholic. The son had probably committed suicide, and there was no evidence to support the accusation, which originated in a mob, and was fostered by Roman Catholic religious societies, the White Penitents, and the Franciscans, who treated the suicide with the honors due to a martyr. After a trial which lasted a whole winter, the Parliament of Toulouse, by a majority of eight to five, condemned Calas to death on the rack and confiscated the estate of the family. Calas's widow made Voltaire's acquaintance in Switzerland, and he actively took up her cause. After long labor he secured a rehearing of the case and the Parliament of Paris declared Calas innocent and restored the estate to the family. The chief magistrate was degraded and fined. Consult Coquerel, *Jean Calas et sa famille* (Paris, 1858); and for Voltaire's part in the matter, Kreiten, *Voltaire* (Freiburg, 1878).

CALASIAO, kä-lä'sê-ä'ô. A town of Luzon, Philippines, in the Province of Pangasinan, 9 miles southeast of Lingayen. Population, in 1898, 13,750.

CALATAFIMI, kä-lä'tä-fē'mê. A city of Sicily, 57 miles southwest of Palermo (Map: Italy, G 10). On a hill beside the town, and 1115 feet above the sea, is the castle, of Moorish design, now used as a prison. From it is a splendid view of the Temple of Segesta (q.v.) and of a mountainous landscape. The town had its name, Kalat al-Fimi, from the Saracens, who captured it in 828. In 1860 Garibaldi won his

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first victory over the Neapolitan troops on a field 2 miles to the southwest, marked by a monument erected in 1892. The cheeses of the district have more than a local reputation. Population (commune), in 1881, 10,000; in 1901, 11,426.

CALATAYUD, kä-lä'tä-yōōd' (Ar. *kalat*, castle + *ayub*, a Moorish king). A city of Aragon, Spain, situated on the Jalón, near its junction with the Jiloca, about 48 miles southwest of Saragossa (Map: Spain, E 2). It is built at the base of two rocky ridges, 1700 feet in height, out of the ruins of ancient Bilbilis, which lay about 2 miles to the east. The city is divided into a new and old portion, the former with several fine streets and handsome squares, while the latter is composed of mean buildings and narrow, crooked streets. Calatayud has ruins of a noble Moorish castle, two collegiate churches, and a Dominican convent. It manufactures silk, linen, and hempen fabrics, woolens, paper, leather, etc., and carries on a trade in agricultural produce. Population, in 1897, 10,900.

CALATRAVA, kä'lä-trä'vä. A military and religious order in Spain, instituted in 1158, in the reign of Sancho III. of Castile. It received the town of Calatrava as a perpetual gift, on condition that it should defend it against the Moors. The order was confirmed by Pope Alexander III., in 1164, and very soon came to render effective service in the wars against the Mohammedans. While the Christian States in Spain were exhausting themselves by internal strife, the Order of Calatrava was the main bulwark against the Moors. In 1197 the latter captured Calatrava and the knights removed to Salvatierra. In 1212, however, they not only recovered Calatrava, but had an important share in the deadly blow which was struck at the power of the Almoravides. In 1213 Calatrava united with the Order of Avis. The power of the Knights of Calatrava was shown at the time they joined the orders of Alcantara and Santiago in exacting from Alfonso XI. a guarantee of their liberties and customs. The later history of Calatrava is a series of civil wars between the grand masters, which became so troublesome to the Government that Ferdinand and Isabella, in 1487-88, prohibited a new election and secured the grand-mastership to the Crown by a Papal bull in 1493. Later Charles V. made the order perpetual, with the King of Castile as head. In 1808 Calatrava became an order of merit. On March 13, 1872, the order was suppressed by the republican Government, but was reorganized by Alfonso XII., June 13, 1874. Those who entered the order took the vows of poverty and obedience. At first marriage was forbidden, but Paul III. in 1540 made this concession, and gradually the order lost most of its religious character. The original garb was black, but in 1396 Benedict XIII. (antipope) allowed the knights to adopt the red cross. The present dress is a mantle of white, decorated with a red cross, cut out in the form of lilies.

CALATRAVA, José María (1718-1846). A Spanish statesman, born at Mérida. He became known as an eminent orator of the Liberal Party, and became a member of the Junta of Estremadura in 1808 and of the General Junta in 1810. Because of his radical views he was exiled upon the restoration of Ferdinand VII., in 1814, but returned to Spain after the King's deposition. In 1821 he was elected to the Cortes, and in 1823 he became Minister of Justice, but when, through the intervention of the French, Ferdinand regained absolute power (1823), Calatrava was again banished. He lived in London until 1830, when he returned to Spain, became Minister of Foreign Affairs (1836), and was prominent in the parliamentary movement which resulted in the adoption of the more liberal Constitution of 1837. When Queen Isabella assumed the Government, in 1843, he was made a Senator.

CALATRAVA LA VIEJA, lä vyä'hä (Sp., Calatrava the Old, from Ar. *kalat*, castle + *Rabah*, a man's name), or Old Calatrava. A ruined city of Spain, near Valdepeñas, situated on the Guadiana. In the Middle Ages it was a strongly fortified place; but nothing now remains save a single tower. Calatrava la Vieja was captured from the Moors by Alfonzo VIII. of Castile, and given to the Templars; unable to defend it, they returned the gift to Sancho III. (1157). Raymond, Abbot of Fitero, and Diego Velasquez here instituted the Order of Calatrava (q.v.) in 1158. In 1197 the Moors captured Calatrava la Vieja, but it was retaken in 1212. About 1217 the Knights of Calatrava la Vieja built a convent in the neighborhood, naming the place Calatrava la Nueva (New Calatrava).

CALAUA, kä-lä'wä, or **CALAWA.** A Malay people in northern Luzon. Their speech is mixed. See Philippines.

CALAVERAS (käl'ä-vä'ras) **GROVE.** The nearest to San Francisco of the California groves of big trees. The grove is 70 by 1100 yards in extent, and contains about 100 of the big trees, of which the "Keystone State," the highest now standing, has an altitude of 325 feet and a circumference of 45 feet. The "Mother of the Forest" is 61 feet, and the "Father of the Forest," not standing, is 112 feet in circumference. The grove is State property under a commissioner.

CALAVERAS RIVER. A small river of central California, and a tributary of the San Joaquin, which it joins just below Stockton (Map: California, C 2). It rises in the Sierras of Calaveras County and pursues a southwesterly course.

CALAVERAS SKULL. A much-discussed human cranium reported to have been found in auriferous gravels below lava-beds near Angels, Calaveras County, Cal. The specimen was described by J. D. Whitney, and is preserved in the Peabody Museum, Harvard University. Satisfactory accounts of the object and its associations have been published by Holmes in the *Smithsonian Report* for 1901 and elsewhere. See Archæology, American.

CALBAYOG, käl'bä-yōg'. A town of Samar, Philippines, situated on the western coast, 12 miles northwest of Catbalogan. Population, in 1898, 30,250.

CALBUR'GA. See Gulbarga.

CALCAIRE GROSSIER, käl'kär' grō'syä' (Fr., coarse limestone). The middle Eocene stage of the Tertiary system of France. The strata of which it is composed are almost wholly limestones, and they outcrop in great force in the Paris basin. They have been subdivided into lower, middle, and upper sub-stages, the first and

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third being fresh-water deposits, and the second of marine formation. The strata are highly fossiliferous; the animal remains include mammalia, reptiles, and a large variety of lower life-forms. The Calcaire Grossier is represented in the English Tertiary by the Bracklesham beds; in the United States the Claiborne beds are equivalent to a portion of it.

CALCAR, käl'kär, JOHN or JOHANN DE. See KALKAR, JOHANN STEPHAN DE.

CALCA'REOUS ROCK (Lat. *calcarius*, pertaining to lime, from *calx*, limestone, lime). Rock containing much lime, especially that in which the lime occurs in the form of carbonate ($CaCO_3$). Calcareous rocks may be chemically formed, as in the case of tufa, where lime carbonate in solution is precipitated through evaporation or other causes. They are generally aqueous rocks, and have been deposited in bodies of either marine or fresh water; the calcareous content has been supplied by the fossilized remains of the hard parts of animals that inhabited these waters. Thus many Paleozoic limestones are composed of shells, corals, and crinoidal fragments, while others, like chalk, consist of foraminifera and fragments of other minute organisms. A crystalline structure varying in degree from that of partially crystallized limestones to the granular statuary marble, is produced in calcareous rocks by metamorphic action. Oölite is a calcareous rock composed of small, concretionary, egg-like grains, resembling the roe of fish. The existence of the carbonate in rocks can be readily detected by the application of dilute nitric or muriatic acid, which causes effervescence through the liberation of carbonic acid. Quicklime is obtained from calcareous rocks by calcining them, i.e. by driving off the carbonic acid and other volatile matter by heat. Calcareous soils, often of great fertility, are produced from the disintegration of calcareous rocks. See ROCK; OÖLITE; SOIL; LIMESTONE; CALCAREOUS TUFA.

CALCAREOUS TU'FA (It. *tufa*, from Lat. *tofus*, tufa, tuff), CALC-SINTER, TRAVERTINE, STALACTITE, ONYX MARBLES. Forms of carbonate of lime deposited from solution in springs, in limestone caverns, or by the evaporation of water in lakes, in the form of calcite or aragonite. When free from impurity they are white or translucent, but commonly they are stained with other substances, taking on yellow, gray, brown, or other colors. They have a spongy or cellular or concretionary structure, are banded, and often show rings of growth. A great variety of forms is exhibited, massive, tubular, botryoidal, stalactitic, or the forms of vegetable and animal remains which they sometimes incrust. Calcareous tufa has often been quarried and used for building purposes; the stone is quite soft when newly quarried and acquires hardness and solidity through exposure to the atmosphere. The temples of Pæstum, Italy, built several centuries before the commencement of our era, were constructed of such massive calcareous tufa. See CALCAREOUS ROCK; LIMESTONE; ROCK.

CALCASIEU, käl'kä-shū. A river of southwest Louisiana, its headstream, Cypress Branch, rising in Natchitoches County (Map: Louisiana, B 3). It pursues a course at first southeast, then southwest, and empties into Lake Calcasieu (nearly 20 miles long and 3 to 6 miles wide), which is connected with the Gulf of Mexico by the narrow Calcasieu Pass. By means of numerous branches, chiefly from the west, it drains a large area in southwest Louisiana, and is navigable for small boats for about 130 miles.

CAL'CEOLA'RIA (Neo-Lat., from Lat. *calceolus*, a little shoe, referring to the part of the corolla resembling a slipper). A genus of plants of the order Scrophulariaceæ. There are numerous species, natives of South America, chiefly of that part of the Andes which is more than 9000 feet above the sea, a few of them reaching almost to the upper limits of vegetation. Some are found in lower and warmer situations, and some in the southern extremity of the American continent, others occurring in New Zealand and Mexico. They are so abundant in some parts of Chile and Peru as to give a peculiar aspect to the landscape. The calyx in this genus is four-partite; the corolla, two-lipped, the lower lip remarkably inflated, so as to form a bag; and the shape of the whole in some species considerably resembling that of a slipper. Some of the species are shrubby, some herbaceous, almost all the herbaceous species being perennial. Many of them have corymbs of numerous showy flowers. Yellow is the color which chiefly prevails in the flowers, and next to it purple; but the art of the gardener has succeeded in producing varieties and hybrids which exhibit many other rich and delicate tints. Calceolarias have been prominent in floriculture since about 1830, the curious appearance of the flowers combining with their beauty to render them attractive, and in no genus is the production of hybrids more easily or frequently effected. They are easily propagated by cuttings. Few plants require more liberal supplies of water. They are generally treated in the United States as half hardy or as greenhouse plants, and only the herbaceous forms are well known. Some of the species are used in South America for dyeing. The roots of *Calceolaria arachnoidea*, which is claimed to be one of the parents of many of the hybrids, are largely employed in Chile, under the name of *relbum*, for dyeing woolen cloths crimson. For illustration, see GREENHOUSE PLANTS.

CALCHAQUI, käl-chä'kē. A tribe formerly living on the western border of the Chaco, about the present Tucuman, Argentina. Great walls of cut stone found in their ancient territory, and stone-built tombs in which are found mummies and deposits of gold and copper ornaments, attest a considerable degree of civilization, which may have been due to the Incas, who conquered the Calchaqui about the year 1450. Interesting details of their customs and home life are given by the earliest missionaries. They have been long extinct, unless, as Tschudi surmises, a refugee remnant still survives on the northern coast of Chile. Even their linguistic affiliation is a matter of conjecture.

CALCHAS, käl'käs (Gk. Κάλχας, *Kalchas*). The prophet of the Greek army before Troy, gifted by Apollo with knowledge of the past and future. Through his counsel Achilles, Neoptolemus, and Philoctetes were brought to the army. At Aulis he advised the sacrifice of Iphigenia (q.v.) to appease Artemis, and foretold the length of the war. The common tradition made him go from Troy to Colophon, where, at the

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oracle of Apollo at Clarus, he met the prophet Mopsus, who defeated him in a contest of prophecy, whereupon he died of grief. His grave was shown in Italy.

CALCIF'EROUS (Lat. *calx*, lime + *ferre*, to bear). The term given to a subdivision of the Ordovician system. It is usually a sandy magnesian limestone, known as the calciferous sand rock. It is found in Canada and New York, extending southward through New Jersey and Pennsylvania. Its equivalent is also to be seen in the magnesian limestones of Iowa, Missouri, and Michigan. The formation is now known as the Beekmantown beds, from the locality near the village of that name in New York State. See ORDOVICIAN.

CALCIMINE (Lat. *calx*, limestone). A composition of zinc-white and glue sizing mixed with water, and applied as a finish to the plastered ceilings and side-walls of rooms. By adding coloring matter, any color desired may be produced.

CALCINATION, or **CALCINING** (Fr., Med. Lat. *calcinatio*, from Lat. *calx*, lime). The process of heating or roasting in furnaces, kilns, or heaps the various metallic ores, limestones, cement-mixtures, etc. It is resorted to as the first stage in the extraction of the majority of the common metals from their ores, is an essential process in lime and cement manufacture, and is a process of oxidation. See IRON AND STEEL; CEMENT.

CALCITE (Lat. *calx*, lime), CALCAREOUS SPAR, or CALC-SPAR. An anhydrous calcium carbonate that crystallizes in the hexagonal system, and differs from the mineral aragonite only in its form of crystallization. The massive and crystalline varieties are known as *limestone*, *marble*, and *chalk* (qq.v.), and are found almost universally, and in all geological formations. It is generally white or colorless, although pale shades of gray, red, green, blue, violet, and yellow are known, and, owing to the presence of impurities, even black and brown varieties are found. The crystallized varieties include the *dog-tooth spar*, the acute scalenohedral, crystals of which suggest its name; similarly, the name of *nail-head spar* has been suggested by the form of its truncated crystals; *satin spar* is a fine fibrous variety with a silky lustre. *Iceland spar*, originally found in basalt rocks in Iceland, is a fine, colorless, translucent variety, with the property of double refraction; the finest specimens of this variety are used for making polarizing prisms. Calcite is found chiefly in the following localities: Andreasberg in the Harz Mountains, Alston Moor and Egremont, Cumberland, and Matlock, Derbyshire, England, and Rossie, N. Y., the copper-mines at Lake Superior, and Warsaw, Ill., in the United States.

CAL'CIUM (Neo-Lat., from Lat. *calx*, lime). A metallic element isolated by Sir Humphry Davy in 1808. The name is derived from the Latin *calx*, lime, showing that calcium is the metal contained in lime. Calcium is not found native, but occurs extensively in combination with other elements in the forms of calcite (including limestone, marble, and chalk), aragonite, dolomite, selenite, gypsum, etc. It is also found in river and spring waters and in the bodies of plants and animals. Spectrum analysis has revealed its presence in the sun. Davy obtained metallic calcium by the electrolysis of calcium chloride in the presence of mercury, the metal remaining as a powder on heating the amalgam thus produced. Calcium (symbol, Ca; atomic weight, 40.07) is a lustrous, clear, yellowish-white, very ductile, and malleable metal of specific gravity 1.57. It melts at a red heat. The metal itself has no commercial application, although it is capable of forming a crystalline alloy with zinc. It is readily oxidized in the air, even at ordinary temperatures, and when heated to redness it burns with a very bright yellow flame. Like sodium and potassium, it decomposes water with evolution of hydrogen. With the non-metallic elements it is capable of forming compounds which are generally colorless and have an acrid taste. The more important of these compounds are described under their special names.

CALCIUM CARBIDE, Ca_2C. A compound of calcium and carbon. It was originally discovered in 1836 by Edmund Davy, who produced it simply as a laboratory curiosity. In 1862 Wöhler prepared it in Göttingen, and about the same time Berthelot, in Paris, obtained it, but only in small quantities. In 1892 Thomas L. Willson, in Spray, N. C., found that by heating a mixture of lime and carbon in an electrical furnace, calcium carbide and carbon monoxide were formed. Almost simultaneously Henri Moissan, in Paris, announced his discovery of a similar method for its production. Its property of decomposing water with the formation of acetylene gas had already long been known, and the foregoing method just described made possible the economical production of acetylene gas for illuminating purposes, and accordingly that industry has since been largely developed, especially in the United States. The calcium carbide, or carbide, as it is called commercially, is now largely manufactured at Niagara Falls, N. Y., and Sault Ste. Marie, Mich.; and also at various places in Europe. The process consists essentially in submitting a mixture of powdered lime and coke-dust to the action of carbon electrodes in a furnace at a temperature of about 3300° C. The fused material is allowed to cool and harden, after which it is removed. Calcium carbide is a hard, brownish crystalline compound with a metallic lustre and a specific gravity of 2.22, that is non-inflammable, infusible, and insoluble in most acids and all alkalies; is absolutely unaffected by jars, concussions, or time, and is an inert and stable substance, except when brought into contact with water. Its principal use is for the manufacture of acetylene. Since its commercial introduction into the United States, its manufacture has passed into the control of a single corporation, who report that over 7000 tons of carbide were consumed in the year ending June 1, 1899. Its history and methods of production have been largely described in the various technical journals, and the *Acetylene Gas Journal*, published in Buffalo, N. Y., is devoted to the exploitation of the new illuminant. Consult, also, Thompson, *Acetylene Gas: Its Nature, Properties, and Uses*; also *Calcium Carbide: Its Composition, Properties, and Method of Manufacture* (London, 1899). See ACETYLENE.

CALCIUM LIGHT. See DRUMMOND LIGHT.

CAL'CRAFT, JOHN WILLIAM. The *nom de plume* of John William Cole. See BRIDE OF LAMMERMOOR, THE.

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CALCULATING MACHINES (from Lat. *calculare*, to reckon, compute; see CALCULUS). Mechanical contrivances designed to facilitate computations, to relieve the calculator from the mental strain of his work, and to insure greater accuracy in results. Calculating machines exist in various forms, and are now made in such perfection that large business houses and banks regard them as a necessity, while many scientific computations would have been abandoned but for their help. An instrument which is used for the purpose of illustration or instruction in number work is called a reckoning apparatus, but one which automatically produces the results of number combinations involving the union of different orders is called a calculating machine.

The earliest known instrument of calculation of any importance is the *abacus*. The Chinese lay claim to its invention. Its use by the Egyptians as early as B.C. 460 is definitely asserted by

1	5	9	7	8	
2	1/0	1/8	1/4	1/6	
3	1/5	2/7	2/1	2/4	
4	2/0	3/6	2/8	3/2	
5	2/5	4/5	3/5	4/0	
6	3/0	5/4	4/2	4/8	
7	3/5	6/3	4/9	5/6	
8	4/0	7/2	5/6	6/4	
9	4/5	6/1	6/3	7/2	

ARRANGEMENT OF NAPIER'S RODS.

Herodotus. It was probably used by the Babylonians, and certainly by the Greeks and Romans, from whom it spread to all Europe. It has existed in various forms—the knotted strings, the sand-board, the pebble-tray, the counters, and the frame of beads. The last form is still in use, known as the Chinese *swan-pan*, the Russian *Stchoty*, or the Japanese *Soro-Ban*. The ordinary swan-pan consists of a frame divided into two sections, holding several parallel rods, each containing several movable beads.

In the Chinese swan-pan, each bead on the bottom row in the right division represents one unit, and each on the bottom row in the left division represents five units. In the next higher row the value of each bead is ten times as great, and so on.

The first improvement over the ancient abacus consisted in the use of counters, on a plan attributed, probably erroneously, to Boethius. Later these counters bore numbers, and were attached to rods, disks, or cylinders, which could be moved so as to indicate the desired results. A notable example of this type is the set of rods invented by Napier and known as virgulæ: or, popularly, as Napier's rods or bones. These consist of flat pieces of bone or ivory, divided into squares, which (on ten of the rods) are subdivided by diagonals into triangles, except the squares at the upper ends of the rods, which spaces are numbered from 1 to 9.

To illustrate the process of multiplication consider the product of 5978 by 937. Arrange the proper rods, as in the figure, so that the numbers at the top indicate the multiplicand, and on the left place the rod headed 1. In this rod find the right-hand figure of the multiplier, which in this case is 7. Passing across this horizontal row, add obliquely the two rows of corresponding digits, writing the results in each case as the digits of the first partial product. For example, the first figure on the right is 6; this is written in the units place in the first partial product. Next add the 5 and 9 in the adjoining oblique row, which gives 4 in the tens place, with 1 to carry. This makes 8 in the hundreds column. Proceed in the same way with the other figures of the multiplier, and add the partial products as in ordinary multiplication.

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  41846
  17934
  53802
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 5601386
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The chief point of improvement over the primitive abacus consists in supplying the instrument with moving scales, which enable the calculator to form number combinations without actually counting together the different addends. Kummer (1847) accomplished this by running parallel rods in grooves; Lagrous (1828) by concentric rings; Djakoff and Webb by bands on rollers.

Another form of the calculating machine is the *slide rule*, which is more generally employed than any other class of calculating instruments, particularly by engineers and statisticians. In its simplest form it consists of two rules, arranged to slide on each other, and so divided into scales that by sliding the rules backward or forward until a selected number on one scale is made to coincide with a selected number on the other, the desired result is read off directly on a third scale. By means of a duplex slide rule, where the rule may be set for four factors instead of two, more complicated problems may be solved. *Revolving slide rules* are employed to increase the virtual length of the scales and the number of decimal places to which results may be read. In the Thacher calculating instrument, a cylinder 4 inches in diameter and 18 inches long revolves within a framework of triangular bars, each of which contains a scale on two sides. The scales contain 33,000 divisions and 17,000 engraved figures, executed on a dividing machine made expressly for the purpose. *Fuller's spiral slide rule* consists of a wooden cylinder containing a spiral scale 42 feet long.

Circular slide rules, resembling watches, are also made. The slide-rule principle is also employed in instruments used to work out specific problems, such as the flow of water in pipes, or the strength of beams. Such *computers* may be either like the ordinary slide rule, with scales in terms of the factors involved, or, as in the various Cox computers, there may be a founda-

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tion plate, revolving disk, revolving segment, and index or pointer, with proper scales. The various slide rules proper all depend on the mechanical use of logarithms, and the scales are graduated on a logarithmic basis. By referring to the article LOGARITHMS, the operation of a simple slide rule will readily be understood, as the various graduations correspond to the logarithmic functions, and the appropriate length of each is determined from a table of logarithms. The figures inscribed on the scales, however, are those of the numbers corresponding to the logarithms. For example, to multiply 2 by 2, the number 2 on the scale is brought opposite the number 2 on the second scale, and, as a result, the zero of the latter is distant from the zero of the first by an amount equivalent to the sum of the two logarithmic graduations. The number corresponding to the point at which the zero or indicator stands is, of course, the product, which in this case is 4. The complexity of the problems which may be solved with the aid of the slide rule varies with the different rules; but, in general, it may be said that all problems involving multiplication and division may be solved by any of them, including powers, roots, and proportions, simply by setting the rule and reading off the indicated result. By providing scales with trigonometrical instead of arithmetical functions, the uses of the slide rule may be increased greatly, and often the two classes are engraved on reverse sides of the smaller slide rules. The rule is particularly valuable where the same operation is to be repeated many times, as in computing percentages, or where many long and wearisome calculations are to be made.

The improved calculating instruments of Slonimsky (1844) and Lucas (1885) effect multiplication without the supplementary addition required by Napier's rods. Quotients and remainders, in the case of division, are likewise fully determined by Genaille's instrument. Instruments in which mechanisms are combined for both addition and multiplication are sometimes called *arithmographs*. Rous (1869) constructed an apparatus of this kind, combining a set of Napier's rods with the abacus. More perfect forms are those of Th. von Esersky (1872), Troncet (1891), and Bollée (1895). These form the border line between the elementary reckoning apparatus and the more elaborate calculating machine. As numbers are essential to reckoning, so number mechanism is the basis of calculating machinery. This mechanism is arranged for the decimal system, and combines elements for the various powers of 10. The elements are usually cylindrical disks, on whose plane or curved surfaces are placed the figures 0, 1, 2, . . . 9, once or several times. Whatever the arrangement of these number disks, their axes of rotation may be parallel and lie in a plane, or may form the elements of a cylindrical surface, or may coincide so that the numbers are beside one another on a common cylinder. This last arrangement, which seems to have appeared for the first time in the machine of Périere (1750), is preferred, because it requires the least space and brings the figures into close proximity. In every calculating machine the mechanism automatically carries over from any order to the next higher. Whenever a number disk is rotated so that it points to the figure 9, any further movement also moves the disk of the next order; that is, for every ten-place rotation of any desired number disk, the next disk rotates one place. For addition, it is only necessary that each element of the number mechanism admit of being moved forward independently one or more figures. For subtraction, the older machines generally contain rows of red figures arranged in reverse order, so that the motion of the disk may still take place in the same sense. It is immaterial whether this motion be produced directly by the hand or indirectly by a lever; but it makes a difference in the rapidity of the work whether different figures of the same rank are added by the movement of one and the same element, or by the motion of different elements. To the first group belongs the oldest of all calculating machines, the *machine arithmétique* of Pascal (1642), designed for adding and subtracting. The modern machines of Roth (1843) and Webb (1868), and Orlin's *automatische Schraubenrechenmaschine* (1893), are modifications of the *machine arithmétique*. The necessary speed and accuracy of movement have been gained by the introduction of keys, as in the machines of Stettner (1882) and Mayer (1887). A key being provided for the numbers from 1 to 9, in the various orders, one has to fix the eye upon the numbers of one figure only. The latest improvement is a contrivance for automatically printing both the addends and their sum, thus leaving little to be desired in the form of an addition instrument. This is a feature of Burrough's registering accountant (1888) and Carney's cash register. Goldman's 'arithmachine' (1898) is one of the latest of the simple and practical machines.

In order mechanically to effect repeated addition—that is, multiplication—a rack or special carrying apparatus is necessary. This device makes it possible by a single motion of the hand, as the rotation of a crank, to carry simultaneously the set of number disks over a desired number of places. Four methods have been devised for this, but the most common is the *stepped reckoner* of Leibnitz, a cylinder with nine teeth of different lengths, corresponding to units, tens, etc. Another means also known to Leibnitz, and lately coming into favor, is the use of toothed wheels, whose teeth may be shoved in at will, thus rendering the wheels inoperative. Among the instruments of this type, with slight modifications, are the arithmometer of Thomas (1820), the machine of Maurel and Jayet (1849), and the arithmometers of Odhner (1878) and Küttner (1894). The *machine à calculer* of Bollée (1888), designed especially for multiplication, operates on a new principle. The products of numbers from 1 to 9 are represented by pairs of pegs, whose lengths correspond to the units and tens of the products. The pegs limit the freedom of the rack, which can be so moved that the product of the multiplicand by each figure of the multiplier is carried over to the addition machinery. In the calculating machine of Steiger (1892) partial products are expressed by pairs of disks, and in Selling's *elektrische Rechenmaschine* (1894) by electro-magnets. These machines are defective in that the multiplication must be performed step by step, using a multiplier of one figure only. They are made to perform division by moving a lever, which reverses the motion of the number disks. Much care has also been given to perfecting in-

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struments having for their object the computing of mathematical and astronomical tables and the tabulation of functions. These are, in fact, the only means of producing thoroughly accurate tables. The idea practically originated with Müller (1786), but Babbage (1823) was the first to obtain valuable results with a machine of this kind. The machines of Wiberg (1863) and Grant (1871) are improved forms of this type. Babbage (1834) also invented an 'analytic engine,' designed to perform various analytic and arithmetical operations, but it was never completed.

The following machines of recent mention are extensively used; the first three are of German make and the last three American, the latter being the more practical: Beher's addition machine (1892), of keyboard type, limited to sums under 500; Illgen's calculator (1888), limited to sums under 1000; Runge's addition machine, Berlin (1896), adding numbers of several figures; Felt's comptometer, Chicago (1887), keyboard type, performing all four operations; Burrough's registering accountant, Saint Louis (1888), an addition machine of 81 keys, with a capacity of 2000 entries per hour, and automatically printing both the addenda and the total sum; Carney's cash register, Dayton (1890), an adding and printing machine of great perfection.

CASH-REGISTERS are a form of calculating machine in general use in retail stores, whose chief functions are to make a record of money received from sales of merchandise in a retail store, as the money is placed in the cash-drawer, and to add automatically this sum to the total previously placed in the drawer; it also indicates to the customers the record which has been made. The more complex cash-registers have been further developed so that it is possible to include an automatic record of other transactions which take place in a retail store, including credit sales and the separate sales of individual clerks or of particular lines of goods, so that they may be referred to at the close of the day's business.

The first practical cash-register was invented by James Ritty, of Dayton, Ohio, who secured his patent in 1879. In this first register the record was made on adding wheels and displayed by hands on a dial, but in later inventions the record is sometimes made by puncturing printed rolls of paper and is shown by indicators which rise and fall as the mechanism is operated, a number equal to the amount of the purchase rising as the cash paid is deposited in the drawer, the same operation causing the number which records the previous purchase to fall. In the 'detail adders,' manufactured by the National Cash Register Company, the mechanism is operated by pressing the proper registering key. A single pressure of the finger unlocks and throws open the cash-drawer, rings a bell, drops the indicator showing the last transaction, raises an indicator showing the amount of the new transaction, and at the same time records it on the adding wheels inside the register. Each registering key is connected with a corresponding adding wheel inside the register, which shows the total amount of registrations made on that key. For example, if the '5-cent' key be pressed five times its corresponding adding wheel shows a total of 25 cents. Thus the total amount of the day's sales can be ascertained at any time by adding together the total amounts shown by the adding wheels. These registers can be arranged to keep separate record of 'charge,' 'received on account,' and 'paid out' transactions, or to show separately the receipts from different classes of goods. A drawer cannot be opened without making both an indication to the customer and an inside record under lock and key.

ELECTRIC TABULATING MACHINES, such as the one devised by Hollerith for recording and summarizing the United States census returns, may be classed under calculating machines. This apparatus is in three parts. The first operation is to punch holes in a card, corresponding to the facts to be recorded for each individual, the punches being operated from a keyboard of 240 characters. After the cards are punched they are fed into a machine, which, by means of the holes and certain electric devices, adds one to the total record for the fact indicated by each hole, such as sex, color, or age. Next the cards are placed in sorting boxes, in order to secure a combination of facts, such as the number of black persons who are married, and by means of electric connections which are acted upon only by cards having holes corresponding to the facts to be tabulated, the record is made.

For descriptions of calculating machines, consult: Mehmke, "Numerisches Rechnen," in *Encyklopädie der mathematischen Wissenschaften*, Vol. I. (Leipzig, 1901), containing numerous figures; Unger, "*Einige Additionsmaschinen*," *Abhandlungen zur Geschichte der Mathematik*, Vol. IX. (Leipzig, 1899); Shaw, "Theory of Continuous Calculating Machines," in *Phil. Transactions of Royal Society*, Vol. CLXXVI. (London, 1885).

CALCULATORS (Lat. *calculator*, computer; see CALCULUS), REMARKABLE. Arithmetical prodigies, often spoken of as 'lightning calculators,' having an unusual capacity for combining numbers. The wonderful feats of these prodigies have been pronounced genuine by competent judges, although their psychological peculiarities have not been fully explained. Two peculiarities, however, seem characteristic of most of the known cases: an extraordinary memory for numerical combinations, and unusual methods of grouping numbers. That their ability is not entirely the result of special training is attested by the early age at which the power is manifested. Thus, at the age of 6, T. H. Safford computed mentally the number (617,760) of barleycorns in 1040 rods, and could extract the cube roots of numbers of 9 and 10 figures. Buxton solved the problem, to find the product of doubling a farthing 139 times, the result, expressed in pounds, being a number of 39 figures. Zerah Colburn, at 9 years of age, gave at sight the factors of 294,967,297, and in 20 seconds found mentally the number of hours in 1811 years. Raising 991 to the fifth power in 13 operations, and giving the product of any pair of two-figure numbers in 1½ seconds, are feats accomplished by Arthur Griffith, who also memorized the squares of all numbers up to 130 and the cubes up to 100. Other noted prodigies are Annich, Bidder, Vinckler, Pughiesi, Mondeux, Magimelle, and Inaudi.

CALCULUS (Lat., a small stone, or pebble, which was used in reckoning, or calculations, by the Romans). A term applied in mathematics

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o any method of treating problems by means of system of algebraic notation. Thus, the Calulus of Forms (see FORMS) is a symbolic treatnent of the properties of invariants; Imaginary Calculus is the method of calculating by the use f the imaginary unit (see COMPLEX NUMBER), nd the Calculus of Quaternions (see QUATERNIONS) is the method of treating certain probems with the aid of the quaternion symbolism. Usually, however, the term is employed to desigiate the Differential and Integral Calculus, a ranch of mathematical science affording, by one eneral method, a solution for many of the most lifficult problems of pure and applied mathenatics.

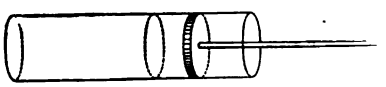
THE DIFFERENTIAL AND INTEGRAL CALCULUS. This is one of the most useful branches of mathenatics. While elementary algebra and geometry leal with quantities whose value is fixed, the calulus investigates quantities whose value is coninually changing. Considering that all nature n all its aspects varies continually, the imporance of a mathematical method of dealing with ariables is evident; and it is easy to see why cience had made so little progress before the nvention of the calculus, and why progress has een so rapid since.

Three simple examples may serve to show the kind of problems usually attacked by the calcuus, and the manner in which it solves them. The irst two of these examples can also, on account of their simplicity, be solved by means of elenentary algebra, without resorting to the calcuus. Nevertheless, they are typical calculus probems, and furnish as good examples of the calcuus method as would be furnished by similar but nuch more complicated problems lying really eyond the power of elementary mathematics.

Problem I. Suppose the sum of two adjoining ides of a rectangle known. What must be the ength of each side so that the rectangle may ave the greatest possible area?

Problem II. A person in a boat 3 miles from he nearest point on a straight shore wishes to each a place 5 miles away from that point. He an row 4 miles an hour and walk 5 miles an our. Where should he land in order to reach is point in minimum time?

Problem III. To determine the work performed when a gas is compressed at constant emperature is one of the fundamental problems of theoretical engineering. Work is generally defined as the force required to move a body, multiplied by the distance traversed. In the case of a gas compressed in a cylindrical vessel, the body moved is the piston. If at the beginning of the experiment the pressure exercised on the pis-



ton is, say, p pounds per square inch of surface, and the area of the piston is a; then $p \times a$ is evidently the force acting on the piston. This force, however, multiplied by the distance traversed by the piston during compression will not by any means give the work performed. For during compression the force will, of course, have to be continually increased; in other words, it will not retain its original value ap fixed, but will be a variable. In this case algebra and geometry fail to give a method of direct computation and the calculus has to be resorted to.

In order to understand how the calculus deals with problems of this nature, it is necessary to grasp clearly some fundamental ideas, which usually appear somewhat difficult to the beginner in calculus, just as the idea of any fixed number being represented by the letters a, b, c, appears difficult to the child first taking up the study of elementary algebra.

Fundamental Ideas: Function, Differential, Differential Coefficient, Limit.—Variables are represented in calculus by the Latin letters x, y, etc., or by the Greek letters ξ, ζ, etc., just as unknown quantities are represented in algebra. If the value of one variable continually depends on that of another variable, the first variable is said to be a *function* of the second, and the fact is denoted by writing: $y = f(x)$. Thus, the variable area y of a square is said to be a function of the variable length x of its side, and in this case the expression $y = f(x)$ stands for the equation $y = x^2$. In investigating the functions and their variables, the calculus catches them at a given moment for the purpose of determining the relative rate of their variation at that moment. Consider the motion of a ball thrown up in the air. Its velocity changes from instant to instant. We might get a rough idea of its motion by measuring the distance traversed during the first second, during the second second, during the third second, etc. But our results would be far from precise; for, however small an interval of time a second is, the velocity of our ball, changing continually, must be different at the end of that interval from what it is at its beginning. Our results would be even rougher if instead of the second we employed as a unit of time the minute. To render the results mathematically precise, we would have to take for our unit not a finite, but an infinitely small interval of time, an instant. The distance traversed during such an interval would be called the *differential* of distance and would be denoted in calculus by the symbol dl, if l stand for distance. Similarly, our infinitely small interval of time would be called the *differential* of time and would be denoted by the symbol dt, if t stand for time. But as this idea of what a differential is is somewhat vague, owing to the difficulty of actually conceiving something that is 'infinitely small,' the following considerations may be resorted to. Studying the motion of a ball thrown up in the air, we consider infinitely small intervals of time dt merely in order to be able to think of the motion as uniform; for within any finite interval the motion is variable. But if at a given instant the motion should actually become uniform, and continue so, we might think of our differential dt as representing any finite length of time, be it 5 minutes, or 10 minutes, or 500 minutes. For when a body moves with perfectly uniform speed, that speed may be readily determined by ascertaining the distance traversed during any interval of time whatever; the result is the same whether we divide the distance traversed in 5 minutes by 5, or that traversed in 10 minutes by 10. We may, accordingly, define the differential of distance dl as the distance that *would be* traversed by the ball in an arbitrary, finite interval of time, dt, beginning at a given instant, if at that instant the motion became uniform. In this manner we may avoid thinking of infinitely small quantities. The velocity would then be $dl \div dt$, no matter how

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great or small dt is supposed to be. The ratio $\frac{dl}{dt}$ is called the *differential coefficient* of l with respect to t—the distance l being of course 'a function' of the time t. This ratio represents a *limit*. For, considering again the ball thrown up in the air, the error introduced by choosing a finite instead of an infinitesimal interval of time is the less the smaller an interval is chosen, and finally the true velocity $\frac{dl}{dt}$ is approached as a limit, when the interval of time becomes infinitely small. All this is concisely represented by a few symbols, as follows:

$$\lim_{\Delta t \doteq 0} \left(\frac{\Delta l}{\Delta t}\right) = \frac{dl}{dt}$$

In this expression Δt stands for some finite interval ('increment') of time, and Δl for the distance actually traversed during that interval. And the expression tells that when Δt approaches zero ($\Delta t = 0$), i.e. when it becomes infinitely small, the ratio $\frac{\Delta l}{\Delta t}$ approaches as a limit the value $\frac{dl}{dt}$. It need hardly be remarked that while dl and dt are themselves infinitesimal quantites, their ratio may have any finite value, large or small.

Maxima and Minima.—Since $\frac{dl}{dt}$ represents the velocity of the ball at any moment of the flight, it is evidently itself a variable quantity. For when, say, a rubber ball is thrown up in the air, the velocity of its motion becomes smaller and smaller until the highest point in its flight is reached; at that point the ball *pauses* for an instant and then begins to descend with increasing speed until it reaches the ground. Here it *pauses* again for an instant and then again goes up in the air. At the instant the ball is at the highest point, as well as at the instant it touches the ground, the velocity is therefore zero; i.e. $\frac{dl}{dt} = 0$. But as the two points reached by the ball are respectively the *highest* and the *lowest*, it may be said that when the function l has its maximum or minimum value, its differential coefficient with respect to its variable (i.e. $\frac{dl}{dt}$) is zero. This must be carefully remembered.

Bearing in mind the ideas explained in the preceding paragraphs, the problems cited at the beginning of the article may now be analyzed without any difficulty.

I. *Solution of the First Problem.*—In the problem of the maximum rectangle, let a be the known sum of two adjacent sides, let x be one of the sides, and let y be the area of the rectangle. Then

$$y = x\,(a - x), \text{ or } y = ax - x^2.$$

Seizing the rectangle at some point in its variation, let us lengthen the side x by some finite amount, Δx, and suppose that this causes the area to increase by a finite amount, Δy. Our equation then becomes

$$y + \Delta y = a\,(x + \Delta x) - (x + \Delta x)^2 = ax + a\Delta x - x^2 - 2x\Delta x - (\Delta x)^2.$$

Subtracting the original equation, $y = ax - x^2$, we get

$$\Delta y = a\Delta x - 2x\Delta x - (\Delta x)^2,$$

and, dividing throughout by Δx,

$$\frac{\Delta y}{\Delta x} = a - 2x - \Delta x.$$

Making Δx smaller and smaller without limit, it will ultimately approach zero. Then $a - 2x - \Delta x$ will become simply $a - 2x$, while the ratio $\frac{\Delta y}{\Delta x}$ will approach its limit $\frac{dy}{dx}$, and hence we will have

$$\frac{dy}{dx} = a - 2x.$$

Now, it was shown above that, at the instant a function passes through its maximum value, its differential coefficient is zero. Hence, when the area of our rectangle is the greatset possible, $\frac{dy}{dx} = 0$, and therefore, $a - 2x = 0$, or

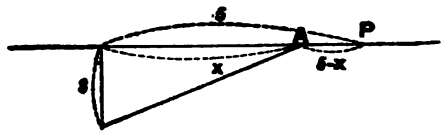
$$x = \tfrac{1}{2}a.$$

But this tells us that each side must be one-half of the known sum, i.e. that the two adjoining sides must be made equal in order that the rectangle may have its maximum area.

The process just employed in solving the problem may be described as 'differentiating with the aid of the theory of limits.' Indeed, we started with the law that the area of a rectangle equals the product of two adjoining sides, a law expressed in our case by the equation $y = x\,(a - x)$. We then ascertained the ratio of the finite increment of area to an actual finite increment of the variable side x. Next we ascertained the limiting value of that ratio corresponding to an infinitely small increase of the side. This gave the value of the differential coefficient $\frac{dy}{dx}$ of our function as $a - 2x$. And as it had been shown before that the differential coefficient is zero at the point where a function has its maximum value, we wrote $a - 2x = 0$, which gave the value of the side x for that point.

By analogous processes of reasoning we may 'differentiate' any function whatever, and thus determine the form of its differential coefficient. In practical work, however, it is not necessary to go through the whole process every time a function is differentiated, and the differential coefficient of a function is usually obtained directly by the use of a few general formulas, the demonstrations of which are given in all text-books of calculus. In solving our other problems we will make direct use of two such formulas.

II. *Solution of the Second Problem.*—In the problem of the person in a boat, call A the point



where he must land in order to reach his point in the least time. An inspection of the accompanying figure shows that the distance of the boat from the point A is $\sqrt{3^2 + x^2}$ (hypothenuse of the right-angled triangle). To row this distance at the rate of 4 miles an hour requires $\frac{\sqrt{3^2 + x^2}}{4}$ hours, or, as it may be written, $\frac{(9 + x^2)^{\frac{1}{2}}}{4}$ hours. The distance of the landing point from the point of destination is denoted by $5 - x$. To walk this distance at the rate of 5 miles an hour requires $\frac{5 - x}{5}$ hours. The total time (call it

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y) required to reach the point is therefore $y = \frac{(9+x^2)^{\frac{1}{2}}}{4} + \frac{5-x}{5}$ The question is, what must be the numerical value of x in order that this expression for time may have the smallest possible value? As in Example I., the question may be answered by ascertaining the form of the differential coefficient $\frac{dy}{dx}$ and making it equal zero, so that it may correspond to the minimum magnitude of y. The result is as follows:

$$\frac{dy}{dx} = \frac{x}{4\sqrt{9+x^2}} - \frac{1}{5}$$

When y is a minimum, $\frac{dy}{dx} = 0$, and therefore,

$$\frac{x}{4\sqrt{9+x^2}} - \frac{1}{5} = 0,$$

whence $x = 4$. To reach the point of destination in minimum time, the person must therefore land 1 mile $(5 - 4 = 1)$ from that point.

Differentiation and Integration.—It may be seen from the examples thus far discussed that the problem of the differential calculus is to obtain for every function considered the differential coefficient $\frac{dy}{dx}$; i.e. the rate of change of the function y with respect to its variable x. The process may also be described as follows: To differentiate a given magnitude, y, expressed in terms of its variable, x, is to obtain the value of the infinitesimal element dy in terms of the infinitesimal element dx of the variable x. The converse process, called integration, may be described as follows: To integrate means to obtain the function itself, when its rate of change with respect to the variable is given; i.e. to find y in terms of x when $\frac{dy}{dx}$ is given. The problem of the integral calculus may also be stated in the following terms: To integrate is to find the magnitude y in terms of the variable x, when dy (an infinitesimal element of y) is given in terms of dx (an infinitesimal element of x). In the latter definition integration appears as a process of *summation*, the addends being an infinite number of infinitely small elements. The symbol of integration is $\int$ (the mediæval S, standing for *summa*). Thus, the symbol $\int dx$ indicates that it is required to integrate the differential of x.

The Constant of Integration.—Since a fixed (constant) quantity neither increases nor decreases, its *differential* is nothing at all. If, therefore, c denote any constant whatever, we may write $dc = 0$. For this reason the differential of $x + c$ is simply dx, the same as the differential of x. Comparing $x + c$ and x, we see that x is one of an infinite number of possible values of $x + c$; the latter, namely, equals x in the particular case where $c = 0$. When it is required to find *in general* the integral of dx, we therefore write not x, but $x + c$. So that $\int dx = x + c$. The constant c is then called the 'constant of integration,' and may either have a finite fixed value, or else may equal zero.

III. *Solution of the Third Problem.*—The last of the cited problems may now be attacked, viz. to determine the work performed when a gas is compressed at constant temperature. The difficulty of this problem is in the fact that during compression the force is variable, i.e. it must be con-

tinually increased. If we were to suppose the force constant, we would, in calculating the work, commit the greater an error, the greater the amount of compression. But suppose the piston to be moved inward only an infinitely small distance. If we then calculate the work required, on the hypothesis that within that distance the pressure remains constant, we commit only an infinitely small error. In other words, our result is infinitely near the truth. Let dl therefore stand for an infinitely small distance traversed by the piston, let the area of the piston be a, and let the variable pressure be denoted by p. The work is then $padl$. But as adl is the *volume* of the infinitely small cylinder traversed by the piston, it may be denoted by dv and regarded as an infinitesimal element of our cylindrical vessel. The work is thus pdv.

To determine now the finite amount of work required to compress the gas from some initial volume, v_1, to some final volume, v_2, we will first answer the question: How much work would be required in compressing a given amount of gas from any volume v to unit volume? This is accomplished by 'integrating' pdv, i.e. by performing the operation denoted by the symbol $\int pdv$; and our result will be infinitely near the truth, because the error involved in assuming that the pressure p remains constant through the infinitesimal compression dv is infinitely small.

To integrate pdv we must remember that at constant temperature the product of pressure and volume of a gas is constant: $pv = k$, whence $p = \frac{k}{v}$. Substituting this in $\int pdv$, we have $\int \frac{kdv}{v}$. Now $\frac{kdv}{v}$ might be shown, by the method of limit, repeatedly employed in this article, to be the exact differential of either $k\log v$, or $k\log v + c$, c being any constant. We may therefore write, conversely,

$$\int \frac{kdv}{v} = k\log v + c,$$

the constant of integration c being retained so as to give the solution its more general form.

The integral calculus has thus performed for us a wonderful task. Figuratively speaking, it employed a cylinder of volume v filled with gas and compressed it, an infinitesimal amount at a time, until unit volume was attained; it then summed up the infinitesimal amounts of work performed, and it has told us that the total amount of work done is $k\log v + c$. The result is algebraic, since v may have any finite value whatever. But to obtain a desired particular result, all we have to do is to substitute for v some numerical value. Further, the work performed in compressing the gas from some particular volume v_1 to some particular volume v_2 evidently equals the *difference* between the work required to reduce the gas from volume v_1 to unit volume, and that required to reduce the gas from volume v_2 to unit volume. The required

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work, W, between the limits v_1 and v_2 is, therefore,

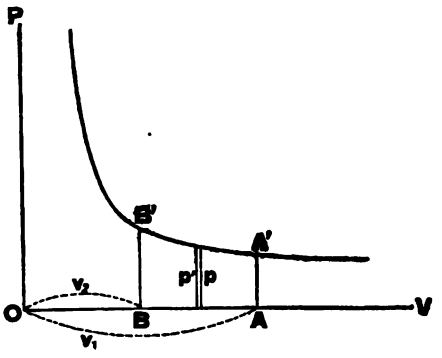
$$W = k\log v_1 + c - k\log v_2 - c.$$

The limits being defined, this 'integral' is called a *Definite Integral*, and the operation is usually denoted as follows:

$$\int_{v_2}^{v_1} \frac{kdv}{v} = k\log v_1 - k\log v_2 = k\log\frac{v_1}{v_2}$$

The constant k, coming from the law $pv = k$, depends on the amount of gas employed and on the temperature at which the compression is carried out. It may, of course, be found by actually measuring the pressure and volume of the given amount of gas at the given temperature, and multiplying the pressure by the volume. By substituting in the above expression this value of k, as well as the numerical values of the initial volume v_1 and the final volume v_2, involved in an actual compression, we will finally obtain the work which the problem required to calculate, and this is actually the way in which engineers determine that important quantity.

Another Way of Stating and Solving the Third Problem.—The relation $pv = k$ between the pressures and volumes of a gas whose temperature is kept constant (i.e. the law of Boyle and Mariotte) may be represented geometrically by a curve called an equilateral hyperbola, every point of the curve corresponding to a definite pressure and volume. (See ASYMPTOTE.) Further, it is shown in text-books of natural philosophy that the work performed in compressing the gas from an initial volume represented by the



line OA (see figure) to a final volume, OB, is represented by the area AA'B'B. The problem of determining the work may therefore be viewed as requiring to determine the area inclosed by the hyperbola and the axis OV between the limits $OA = v_1$ and $OB = v_2$. To solve this problem the area AA'B'B may be imagined as made up of an infinite number of infinitely narrow strips. One such strip is roughly shown in the figure between the lines marked p and p'. The difference between p and p' would evidently be the greater, the greater the distance between them. But since the distance is supposed to be infinitely small, the two lines may be taken as equal and the strip may be considered as a rectangle. Calling its infinitely small base dv, the area of the rectangle is seen to be pdv. The total area AA'B'B may now be obtained by summing up the infinite number of 'differentials of area' like pdv inclosed between the limits $OA = v_1$ and $OB = v_2$. The summation may be performed by the integral calculus and is denoted by a definite integral, as follows: $AA'B'B = \int_{v_2}^{v_1} pdv$.

We have seen before that the result of this integration is $k\log\frac{v_1}{v_2}$. The required area therefore equals the natural logarithm of the ratio $\frac{\overline{OA}}{\overline{OB}}$, multiplied by the number (k) representing the product of any pair of coördinates, such as $\overline{OB} \times \overline{BB'}$, or $\overline{OA} \times \overline{AA'}$, etc. The calculus method is analogously employed whenever it is required to find the area inclosed by a given curve, elementary geometry being in most cases powerless to furnish the desired answer; and thus the calculus finds extensive application in the solution of many important problems of geometry.

The above sketch outlines the methods of reasoning by which the calculus attacks problems involving variable quantities. As to its limitations, it must be observed that while the differential calculus teaches how to differentiate readily any function whatever, the converse problem, viz. that of integrating a given differential, is often very difficult, requiring all manner of algebraic artifices, and is sometimes altogether impossible. In other words, in their studies of nature, scientists are often led to construct differentials (just as in our third problem we constructed the differential pdv) which they cannot integrate, because they can conceive no function which, on differentiation, would yield the given differential. Finally, it may be observed that the flour is no better than the grain, and if data that are made to pass through the mill of the calculus lead to doubtful results, it is the fault not of the calculus, but of the data; the calculus itself is as exact as any other branch of mathematics, in spite of the fact that the things it deals with seem so often to dwindle away into nothing.

HISTORY. The invention of the calculus method is generally referred to the latter half of the Seventeenth Century, but the course of its early development really leads much further back. Thus, the 'method of exhaustion,' which, as first applied, consisted in comparing the area bounded by a given curve with the area of an inscribed or circumscribed polygon whose number of sides is continually increased, is related to the present calculus through the doctrine of limits. Similarly, the surfaces of the sphere, cylinder, and cone were compared with prismatic and pyramidal surfaces. By this method Archimedes calculated the value of π, obtained the areas of the parabola, ellipse, and one of the spirals, and found the ratio of a spherical surface to the surface of the circumscribed cylinder. Kepler (1615) was the first to improve this method by introducing into geometry the idea of infinity. He considered the circle as composed of an infinite number of triangles (with their vertices at the centre and with their bases on the circumference), and the cone as composed of an infinite number of pyramids. The next advance is due to Cavalieri (q.v.), who effected quadrature by summing the infinitesimal elements into which he

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divided his areas, and established the properties of the centre of gravity relating to solids of revolution. So far the end sought by mathematicians was the solution of particular problems, as the rectification and quadrature of certain curves. Thus, also, Wallis extended the application of Cavalieri's method of indivisibles, Descartes (1637) increased its power by the introduction of coördinate geometry (see ANALYTIC GEOMETRY), and Fermat applied it to maxima and minima (q.v.). But it remained for Leibnitz and Newton to devise a general notation and to organize existing principles into a comprehensive science. The principles of Newton, which later appeared under the title of Fluxions (q.v.), were first published in his *Principia* (1687). The basal idea of his calculus is that of velocity. A line, surface, or solid is conceived as generated respectively by a moving point, line, or surface. The velocity of a moving point, and its components along the axes of coördinates for successive intervals, were called fluxions. The velocity of the moving point was called the fluxion of the arc generated, and the arc the fluent of the point's velocity. The velocity of a moving point being regarded as constant, the ratio of its component fluxions determined the nature of the path described. In general, the relation between the fluxions being given, the relations between the coördinates of the point were sought, and conversely. An elementary change in velocity (fluxion) along the X-axis was designated by x', $[x]$, or $\dot{x}$; along the V-axis by y', $[y]$, or $\dot{y}$. Leibnitz used the symbol dx instead of x', a symbolism which has endured, while Newton's fluxional notation disappeared in the first half of the Nineteenth Century. The first publication of Leibnitz's principles appeared in the *Acta Erditorum* (Leipzig, 1684). His method differed from Newton's, not only in its symbolism, but also in its relation to pure number. The instantaneous changes in any continuously varying magnitude, regarded by Leibnitz as taking place by infinitely small differences, savor less of mechanics than do Newton's components of velocity. The basal idea, however, in the two systems is the same, and each calculus consists of two parts—(1) differential calculus, which investigates the rules for deducing the relation between the infinitely small differences of quantities from the relation which exists between the quantities themselves; (2) the integral calculus, which treats of the inverse problem, i.e. to determine the relation of the quantities when that of their differences is known.

The influence of calculus has been so extensive on nearly all branches of mathematics that no attempt will be made in what follows to give other than the most prominent names associated with its development. The theory of infinitesimals, which lies at the foundation of differential calculus, has received adequate treatment at the hands of Gauss, Cauchy, Jordan, and Picard. With the development of the general theory of functions are connected the names of Clairaut, D'Alembert, Euler, Lagrange, Gauss, Cayley, Cauchy, Riemann, Weierstrass, and Lie; with elliptic and Abelian functions the names of Landon, Jakob Bernoulli, Maclaurin, D'Alembert, Legendre, Clebsch, Abel, Jacobi, Eisenstein, and Brioschi; with the theory of the potential, Lagrange, Green, Gauss, Dirichlet, Riemann, Neumann, Heine, and Beltrami; with differential equations, the Bernoullis, Riccati, Clairaut, Euler, Lagrange, Monge, Cauchy, Clebsch, Boole, and Lie; and with the calculus of variations, Jakob Bernoulli, l'Hôpital, Lagrange, Sarrus, Cauchy, Hesse, Clebsch, and Weierstrass.

Calculus is essentially a branch of the science of number. It differs from other branches of this science, as arithmetic and algebra, by regarding number as continuous, i.e. as being capable of gradual growth and of infinitesimal increase, while they deal with finite and discontinuous number. It differs from ordinary algebra in another respect; in the latter, the values of unknown quantities, and their relations with one another, are detected by aid of equations established between these quantities directly; in the calculus, on the other hand, the equations between the quantities are obtained by means of other equations primarily established, not between the quantities themselves, but between certain derivatives from them, or elements of them. This is an artifice of great value, since the relations between the quantities involved in any problem can, in general, more easily be inferred from equations between their derivatives than from those between themselves.

CALCULUS OF VARIATIONS. The basis of this calculus is also a method of differentiation, but of a peculiar kind. In ordinary differential calculus we seek the form which $f(x)$ assumes when x receives an indefinitely small increment, dx. In the calculus of variations, we seek the laws of the changes attending a slight alteration of the form of the function, or in the transformation of one function into another. This calculus treats the so-called isoperimetrical problems, many of which were formerly insoluble. The method has extended application in higher physics.

CALCULUS OF FINITE DIFFERENCES is a calculus concerned with the changes of functions due to finite changes in the variables involved, hence without the assumption of continuity. E, Δ, and Σ are important symbols, E denoting the operation of increasing the independent variable of a function by unity, Δ the corresponding increment of the function, and Σ the summation of all values of the function for integral values of the variable from unity to any desired number.

CALCULUS OF OPERATIONS, as the term indicates, is a systematic method of treating problems by operating algebraically upon symbols of operation. If the symbols ϕ and ψ prefixed to a quantity represent operations of the same class, the law of operations is distributive (see DISTRIBUTIVE LAW) when $\phi(x+y) = \phi x + \phi y$; the law is commutative (see COMMUTATIVE LAW) when $\phi\{\psi(x)\} = \psi\{\phi(x)\}$. If ϕm represents the repetition of the operation ϕm times, the law of indices in ordinary algebra is expressed by

$$\phi m\{\phi^n(x)\} = \phi^{m+n}(x) = \phi^{n+m}(x) = \phi n\{\phi^m(x)\}$$

These laws are true for differentiation, for

$$d_x(u+v) = d_x(u) + d_x(v), \text{ (distributive law)}$$

$$d_x\{d_y(u)\} = d_y\{d_x(u)\}, \text{ (commutative law)}$$

$$d_x^m d_x^n(u) = d_x^{m+n}(u), \text{ (index law)}.$$

CALCULUS OF PROBABILITIES. A systematic analytic treatment of the doctrine of probability (q.v.) by use of the differential and integral calculus.

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CALCULUS OF FUNCTIONS (q.v.). A systematic method of determining functions which satisfy given conditions.

CALCULUS, BARYCENTRIC. A method of treating geometric problems based on the mechanical theory of centres of gravity. In this calculus Möbius (1827) furnished the first example of homogeneous coördinates. See COÖRDINATES.

RESIDUAL CALCULUS. A branch of integral calculus due to Cauchy, in which the integration takes place around a contour inclosing points for which the function is infinite. The integral is called the residual, and in case the contour contains all the critical points, the integral is called the total or principal residual.

BIBLIOGRAPHY. The literature on the subject of calculus is so extensive that any limited selection of references must be unsatisfactory. The best selection of important works will be found in Meyer, *Encyklopädie der mathematischen Wissenschaften*, Vol. II. (Leipzig, 1900). Of the older works the most important are: Leibnitz, *Mathematische Schriften*, ed. by Gerhardt (Berlin and Halle, 1849-63); Newton, *Opuscula* (Lausanne, 1714); Euler, *Introductio in analysin infinitorum*, new ed. (Lausanne, 1848); id., *Institutiones calculi differentialis*, new ed. (Saint Petersburg, 1885); id., *Institutiones calculi integralis*, 3d ed. (Vienna, 1830). Of the later works may be mentioned those of Cauchy (Paris, 1821-47); Bertrand, *Traité de calcul différentiel et de calcul intégral* (Paris, 1864-70); Serret, *Cours de calcul différentiel et intégral*, 4th ed. (Paris, 1894); Hermite, *Cours d'analyse de l'école polytechnique* (Paris, 1873); Laurent, *Traité d'analyse* (Paris, 1885-91); and Jordan, *Cours d'analyse*, 2d ed. (Paris, 1893-96), which may be taken as typical of the best French works. In Germany and Austria, Schlömilch, *Compendium der höheren Analysis*, 4th ed. (Brunswick, 1895); Schlömilch, *Uebungsbuch zum Studium der höheren Analysis*, 4th ed. (Leipzig, 1888); Lipschitz, *Lehrbuch der Analysis* (Bonn, 1877-80); Stolz, *Grundzüge der Differential- und Integralrechnung* (Leipzig, 1893-99); and Riemann, *Gesammelte Werke*, edited by Weber and Dedekind, 2d ed. (Leipzig, 1892). In England, Price, *Treatise on Infinitesimal Calculus*, 2d ed. (4 vols., Oxford, 1855-89); Todhunter, *Differential Calculus* (Cambridge, 1865); and Todhunter, *Integral Calculus* (Cambridge, 1868), are widely known. Italy has recently produced a work of merit, viz., Pascal, *Lezioni di analise infinitesimale* (3 vols., Milan, 1895). Of the American works covering the general field, Byerly, *Elements of Differential Calculus* and *Elements of Integral Calculus* (Boston, 1881), are representative. For the history of the subject, consult the *Encyklopädie* mentioned above; also: Cantor, *Geschichte der Mathematik*, Vols. II. and III. (Leipzig, 1892-98); Ball, *History of Mathematics*, 3d ed. (New York, 1901); Fink, *History of Mathematics*, translated by Beman and Smith (Chicago, 1900). The *Calculus of Variations* is treated historically, as well as mathematically, by Carll (New York, 1885).

CAL'CULUS, or STONE. In medicine, a hard concretion formed within the animal body, in consequence of the deposition in the solid form of substances which usually remain in solution. (See CONCRETION.) The concretions most commonly termed calculi are those formed in the kidneys or bladder (urinary calculi), and those formed in the gall-bladder or biliary ducts (biliary calculi). Both of these give rise to very painful symptoms, and may even threaten life. Biliary calculi, or gallstones, may generally be presumed to exist when excessively severe pain suddenly arises in the right side, beneath the border of the ribs, and when in a few hours jaundice comes on, showing that some obstruction has existed in the outward flow of the bile. But the absolute proof that these symptoms depend on calculus is often wanting. The pain is, fortunately, transitory, but is more severe while it lasts than almost any other known form of suffering, unless it be that of a calculus in the kidney and ureter. It may be relieved by large doses of opium, but the remedy requires to be cautiously given, as even in medical hands fatal accidents have occurred. Gallstones, when impacted in the ducts, have sometimes proved fatal; but much more frequently they find their way, sooner or later, into the intestines. They are almost invariably composed of cholesterin (q.v.), with coloring matter and mucus arranged in layers in a semi-crystalline disposition. In size they vary from that of a small gravel to a diameter of over half an inch.

Urinary calculus occurs at all ages, but is most common in advanced life and in the male sex. It is very frequent in gouty persons, or among those who pursue sedentary occupations and live freely. It is rare among those who live much in the open air, or who take much violent exercise and use little animal food and wine. Among sailors it is peculiarly rare. In certain parts of England the disease is said to be frequent, as in Norfolk; and perhaps along the eastern coast of Scotland. In India, too, where some of the predisposing circumstances mentioned above can hardly be said to prevail, stone is by no means uncommon. The predisposing causes of calculus are still very imperfectly understood. In its early stages the condition usually presents itself in the form of gravel, shown by the passage of numerous very small portions of gritty concretion, which may be observed in the urine as a deposit like sand or like small grains of Cayenne pepper. When such deposits occur frequently—especially if they are present at the time of passing the urine, and not merely after it has cooled — there is reason to apprehend the subsequent formation of calculus. If, in these circumstances, there are pains of a dull character in the loins, with occasional sharper twinges, no time should be lost in seeking medical advice. If a fit of very severe pain should occur in a person for some time affected with gravel; if the urine becomes bloody; if agonizing twinges, commencing in the loins, radiate downward into the thigh or the groin, it is probable that a stone has already formed in the kidney, and is being displaced toward the bladder. Calculus in the bladder is at first attended with little suffering, as compared with that caused by the stone in its passage downward from the kidney; but unless removed or evacuated, the calculus is sure to enlarge, and it then becomes the cause of one of the most painful diseases that afflict humanity. The existence of a stone in the bladder, however, should never be assumed without a surgical examina-

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tion, as all the symptoms are deceptive in certain cases. The most striking (and, perhaps, the most trustworthy) evidence of stone in the bladder, apart from the testimony of the sound (see LITHOTOMY), is smarting and burning pain experienced after the bladder has been emptied, together with occasional temporary stoppage in the flow of urine. The correct appreciation of all the symptoms, however, demands the familiarity with such cases that comes from surgical experience.

The chief varieties of urinary calculus, with respect to chemical composition, are: (1) Uric acid (red deposit); (2) urates of ammonia, soda, lime, etc. (brick-dust sediment); (3) phosphates of ammonia and magnesia, lime, etc.; (4) oxalate of lime; (5) carbonate of lime (chiefly in domestic animals); (6) cystin; (7) xanthic oxide (a very rare form, discovered by Dr. Marcet). Calculi are frequently found to be composed of numerous successive layers, each having a perfectly distinct chemical composition. Urates and phosphates in particular frequently succeed each other, and form what is called an alternating calculus. When calculus has once fairly formed in the urinary passages, no absolute cure exists except the removal of it, if possible, from the body (see LITHOTOMY; LITHOTRITY; and NEPHROTOMY); but in the stage of gravel, and still more in the earlier stages detected by careful examination of the urine, much may be done to check the tendency to this distressing and dangerous malady. The chief remedies consist in careful regulation of the diet and mode of living, together with the use of solvents adapted to the particular form of deposit found to be habitually present. Consult Park, *Surgery by American Authors* (New York, 1901). See URINE.

CALCUTTA (Hind. *Kali Ghāṭā*, the *ghāt*, or landing-place leading to the temple of the goddess Kali). The capital of the Province of Bengal and metropolis of British India, situated on the left bank of the river Hugli, an arm of the Ganges, in latitude 22° 35′ N., and longitude 88° 27′ E., about 100 miles from the sea by the river (Map: India, E 4). Calcutta is the headquarters of the Governor-General of India, and the seat of the Indian Government, also of the supreme courts of justice, of the court of appeals, and of a United States consulate. The appearance of the city, as it is approached by the river, is very striking. On the left are the Botanical Gardens and the Bishop's College, a handsome Gothic edifice, erected by the Society for the Propagation of the Gospel in Foreign Parts; on the right is the suburb of Garden Reach, with its handsome country seats and beautiful gardens; farther on are the Government dockyards and the arsenal; beyond these are the Maidan Esplanade, the favorite place of resort of the élite of Calcutta for their evening drive, the Eden Gardens, with their beautiful tropical trees and plants, and the splendid zoölogical gardens.

Here, near the river, lies Fort William, the largest fortress in India, occupying, with the outworks, an area of about half a mile in diameter. It is garrisoned by European and native soldiers, mounts 619 guns, and its armory contains 80,000 stands of small arms. Facing the esplanade, among other fine buildings, is the Government House, a magnificent palace erected by the Marquis of Wellesley. Beyond this, extending northward along the river-bank, is the Strand, two miles in length, and forty feet above low water, with various ghats, docks, and landing-stages for ocean liners. It is adorned with many fine buildings, including the custom-house, the new mint, and other Government offices; and the appearance given by these and other edifices has gained for Calcutta the appellation of 'City of Palaces.' Among its other places of interest mention may be made of the principal court of justice, the town hall, a fine building, the Bengal and United Service Clubs, Writers' Building, Bank of Bengal, Jesuits' College, medical college, university, the Indian and the Economic museums, theatres, the Y. M. C. A. Building, besides various churches, mosques, Hindu temples, and pagodas, and numerous bazars. There are a number of monuments throughout the city, the most notable being those erected to the Marquis of Wellesley and Sir David Ochterlony. While the European quarter of the town is distinguished for its fine public buildings and commodious dwelling-houses, the quarters occupied by the natives present a very different appearance, their houses being, in most instances, built of mud, or bamboo and mats, and the streets narrow and unpaved. The cyclone of November, 1867, and that of June, 1870, while very destructive—in the first instance destroying 30,000 native houses—made room for considerable improvement. New and wider streets have been opened through crowded quarters and brick houses are replacing the huts.

In 1852 Calcutta was erected into a municipality, the proprietors paying assessments, and electing commissioners to apply the proceeds of these assessments in cleansing, improving, and embellishing the town. The water-supply of Calcutta is good. Formerly the water was kept in large tanks, interspersed throughout the city, whence it was borne by water-carriers or bahisties in large leather bags. Since the year 1865, however, excellent water has been obtained from the Hugli, about 15 miles above Calcutta, where it is filtered and sent down by pipes in the usual way. The works were further improved after 1888, and now yield a daily supply of 20,000,000 gallons. The result of this and of a system of underground drainage with an outlet in the Salt Lake has been a marked improvement in the health of the city, although more is to be desired in this direction, one-fourth of the wards remaining unsewered. A few progressive wards dispose of garbage by modern incinerators. Gas and electric lighting have taken the place of the oil lamps formerly in general use, and there are many miles of street-car lines. A canal girds a part of the city beyond the circular road.

The principal scientific and literary societies of Calcutta are the Bengal Asiatic Society, founded in 1784 by Sir W. Jones, possessing a fine library, and a valuable and extensive museum; the Bethune Society, for the promotion of intercourse between European and native gentlemen; the Dalhousie Institute, for the literary and social improvement of all classes of the community; the Bengal Social Science Association. The University of Calcutta was founded in 1857, on the same basis as the London University, and exercises functions over Bengal, the Northwest Provinces, Oudh, and the Central Provinces. Col-

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leges have been instituted to prepare intending students. Other educational institutions are numerous in Calcutta. There are an engineering college and four Government colleges. The principal places for religious instruction are Bishop's College, intended chiefly for the education of missionaries and teachers, and the institutions of the Established and Free Churches of Scotland for the same purpose.

The communications of Calcutta afford great facilities for its extensive commerce. There are several lines of railway connecting it directly with Khulna in the delta; with Goalanda, an important centre of steamship traffic on the Brahmaputra; with Darjiling in the Himalayas, and with Diamond Harbor and Port Canning. The lines to northwest India and to Bombay start from Howrah, on the opposite side of the Hugli. Calcutta has telegraphic connection with the principal towns of India and communicates with Europe by several lines. Continuous communication, greatly facilitated by the Suez Canal, is kept up with Great Britain by numerous well-appointed steamers and sailing vessels. The river adjacent to the city varies in breadth from a quarter of a mile to nearly a mile. There are dry docks and wet docks. The city has water communication in three directions—to the east by various rivers leading to the Brahmaputra; to the north by the Hugli and the Nadiya rivers leading to the Ganges; to the west by the Midnapur Canal. The port has excellent anchorage and is the lowest of several seaports on the Hugli, which is navigable by sea-going vessels. The port extends for about 10 miles along the river and is somewhat less than 2 miles in breadth at its broadest part, the area being about 8 square miles, and comprised for the most part between the rivers and the circular road, a spacious roadway which marks the landward boundary of the city proper. Beyond this road there lie extensive suburbs, the chief of which are Chitpur, on the north; Nundeu Baugh, Bahar-Simleah, Sealdah, Entally, and Baliganj, on the east; and Bhawaripur, Allipur, and Kidderpur, on the south. The municipality of Howrah, situated on the opposite side of the river and connected with Calcutta by a pontoon bridge, contains the salt-golahs or warehouses of the Government, extensive manufactories, dock-yards, ship-building establishments, and the depot of the East India Railway.

One-third of the whole trade of India passes through Calcutta. The exports are jute, opium, cotton, rice, wheat, sugar, indigo, coffee, tea, saltpetre, linseed, shellac, buffalo-horns, hides, castor-oil, cutch, gunny bags, etc. As a central depot for the richest parts of India, Calcutta has an extensive inland trade. The principal industrial establishments include sugar-refineries, cotton-manufactories, flour, saw, and oil mills, and ship-building docks. Several newspapers are published. There are a few banks and numerous insurance and other companies, with a chamber of commerce. Living is comparatively cheap, and most of the luxuries of life, as well as its necessaries, are to be had as readily as in most European towns. The annual fall of rain averages 64 inches; the temperature in the shade ranges in July from 78° to 87°, and in December from 60° to 79°. In 1837 the population of the town proper amounted to 229,700; it had increased by 1881 to 447,601; in 1891 to 861,764, with suburbs (excluding Howrah, which had 116,606); and in 1901 to 1,121,700, when Howrah also had 157,850. Besides these, thousands of the 3,500,000 who sleep at night in the surrounding districts of Hugli and the twenty-four suburban Parganas flock during the day to Calcutta on foot, by boat, or by railway, to their daily toil. The inhabitants are mostly Hindus and Mohammedans. The Christians number only about 30,000. There is a considerable number of Europeans and of Eurasians, with some Armenians, Greeks, Jews, Parsees, and negroes. Calcutta was the birthplace of William Makepeace Thackeray.

Calcutta was founded by Governor Charnock in the year 1686, by the removal hither of the factories of the East India Company. In 1700 three villages surrounding the factories having been conferred upon the company by the Emperor of Delhi, in recognition of a present made to Azim, a son of Aurungzebe, they were forthwith fortified and received the name of Fort William in honor of the reigning King; but the place was subsequently termed Calcutta, the name of one of the villages. In 1707 Calcutta had acquired some importance as a town, and was made the seat of a presidency. In 1756 it was unexpectedly attacked by Surajah Dowlah, the Nawab of Bengal, and compelled to yield after a two days' siege; 146 men fell into the enemy's hands, and these were cast at night into the notorious 'Black Hole' (q.v.), only 23 surviving the horrors of that night. The city remained in the hands of the enemy until eight months afterwards, when Clive, in conjunction with Admiral Watson, recaptured the place, and afterwards concluded peace with the Nawab. Soon after this and subsequent to the decisive victory of Plassey, the possessions of the East India Company were greatly extended by means of grants made by the Emperor of Delhi, and Calcutta once more resumed its career of progress and prosperity. Consult Stevens, "The Port of Calcutta," in Vol. XLVII., *Society of Arts Journal* (London, 1899); Stevenson, "Calcutta," in *Outing*, Vol. XXXI. (New York, 1900).

CALDANI, kâl-dä'nê, Leopoldo Marc Antonio (1725-1813). An Italian anatomist, born in Bologna. In 1771, on the death of Morgagni, the celebrated anatomist of Padua, Caldani was chosen his successor in the professorship. At the age of 76 he published his principal work, *Icones Anatomicæ*, a series of anatomical plates. He also published *Institutiones Physiologicæ* (1772) and other works.

CALDARA, kâl-dä'râ, Antonio (1678-1736). An Italian composer, born in Venice. He studied there under Legrenzi and became a singer in the Chapel of San Marco. In 1714 he was appointed *maestro di cappella* in Mantua, and from there went to Vienna, where Charles VI. made him one of his vice-chapelmasters and took lessons from him. Caldara is noted rather for the quantity than the quality of his works. He was a most prolific composer for the stage and the Church, and his orchestration was often very elaborate. His compositions include 69 operas and oratorios, and numerous purely religious productions, the most celebrated of which is a *Crucifixus* (1840) for sixteen voices.

CALDARA, Polidoro. See Caravaggio.

CALDAS, käl'dàs (Sp. plur. of *calda*, Lat. *calida*, warm water, Lat. *calidus*, hot). A Span-

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ish term for warm springs applied to numerous places on the Iberian Peninsula on account of their thermal springs. The chief of them are Caldas de Malavella, Caldas d'Estrach, and Caldas de Montbuy, in Catalonia; Caldas de Reyes, Caldas de Taipas, Caldas de Faveios, Caldas de Rainha, Caldas de Gerez, in Portugal. The name is also common in the topography of South America, as Caldas de Minas Geraes, Brazil.

CALDAS, Francisco José de (c.1770-1816). A South American naturalist, born at Popayah, New Granada. He traveled extensively through that country and Peru, and in 1804, by means of a barometer and a sextant constructed by himself, measured Mount Chimborazo, Mount Tungueragua, and several other peaks. He was in charge of the observatory established at the beginning of the century at Santa Fé de Bogotá, and his valuable observations were published in the *Semenario de la Nueva Granada*, the first number of which was issued in 1807 (republished by A. Lasserre, Paris, 1849). Upon the outbreak of the revolution of 1810, Caldas embraced the cause of independence, was condemned to death by Morillo, and executed.

CALDAS-BARBO'SA, Domingos (1740-1800). A Brazilian poet. He was born in Rio de Janeiro, and was the son of a freed negress. He entered the army, participated in the siege of Colonia do Sacramento in 1762, and afterwards went to Lisbon, where he took holy orders. His great improvisational gifts made him a favorite with the best society of Lisbon. His poems are tinged with melancholy and are somewhat pessimistic in tone. Many of them have been collected and published under the title, *A Viola de Lorenо*.

CALDECOTT, kąl'de-kot, Randolph (1846-86). An English illustrator, born in Chester. In early life he was a bank clerk; as an artist he was self-taught. About 1871 he went to London, and a year afterwards settled there, and began regularly to contribute drawings to the leading magazines. His first illustrations were done for Washington Irving's *Old Christmas* (1875). Among others are those for Irving's *Bracebridge Hall* (1876), and for books by Mrs. Ewing and Mrs. Locker. But his best work is a series of children's picture-books, illustrated in color. The series began with *John Gilpin* (1878), and ended with *The Great Panjandrum Himself* (1885). His depiction of country life and animals rivals Leech in humor and draughtsmanship.

CALDERA, kăl-dā'rā (Sp., kettle, Engl. *caldron*, referring to the hollow depression of volcanic origin). A seaport of Chile, in the Province of Atacama (Map: Chile, C 9). It has an excellent harbor, protected by breakwaters; and exports silver and copper, being the port for the productive mining district centring at Copiapó, with which it is connected by rail. There are silver and copper smelters here. The town is the seat of a United States consular agent. Population, in 1895, 1878.

CALDERON, kăl'dā-rōn', Don Serafin Estébanez (1801-67). A Spanish poet and novelist. He was born in Malaga, December 27, 1799, studied law at the University of Granada, and in 1822 became professor of poetry and rhetoric there. A volume of poems which he published shortly after procured for him some distinction. Subsequently, he became an advocate in his native city, but still continued faithful to the Muses. In 1830 he went to Madrid, where he published anonymously his only volume of poems under the title *El solitario* (1831). He also wrote several articles on Andalusian manners for the *Cartas Españolas*, the only literary journal at that period in Spain. In 1836 he was appointed Civil Governor of Logroño, but an accident obliged him to return to Madrid, where he devoted himself to collecting MSS. of the old national literature, to be the basis of a great critical edition of the *Cancioneros* and *Romanceros*. Calderon wrote also a fine novel, *Cristianos y Moriscos* (1838). To the literature of the Spanish Moors he paid great attention. His *Escenas andaluzas* (1847) are a series of lively sketches of Andalusian life. At his death, February 5, 1867, he left behind him a work on the *Expediciones y aventuras de los Españoles en Africa*. The Spanish Government purchased his very valuable library. Consult Cánovas del Castillo, *El solitario y su tiempo*, etc. (Madrid, 1883).

CALDERON, Francisco Garcia (1834—). A Peruvian statesman, born in Arequipa. He became professor of jurisprudence at the age of 21, was elected to the Peruvian Congress in 1867, and in 1868 became Minister of the Treasury. After the occupation of Lima by the Chilean Army in 1881, and the flight of President Piérola, Calderon was elected Provisional President of Peru. In this capacity he attempted to treat with the civilians and to secure the coöperation of the United States. These plans were frustrated by the Chileans, who sent him to Valparaiso as a prisoner. Upon his return to Lima in 1886, he became president of the Senate. He was influential in arranging the Grace contract, by means of which great improvements were made in the finances of Peru. His principal publication is the *Dictionary of Peruvian Legislation*.

CALDERON, kăl'dĕr-on, Philippe Hermogène (1833-98). An English subject and portrait painter of Spanish extraction, born in Poitiers. He studied with J. M. Leigh in London and with Picot in Paris, but established himself in London, where his first picture, "By the Waters of Babylon," was exhibited at the Royal Academy in 1853. Among his most noteworthy paintings are the following: "The Return from Moscow" (1861); "The British Embassy at Paris during the Massacre of Saint Bartholomew" (1863); "Joan of Arc" (1877); "Flowers of the Earth" (1881).

CALDERON, Bridge of. See Puento de Calderon.

CALDERON DE LA BARCA, kăl'dā-rōn' dā lā bär'kā, Pedro (1600-81). An eminent Spanish dramatic poet, next to Lope de Vega, Spain's greatest dramatist, and the most typically national Spanish writer of his century. He came of a good old family, and was born January 17, 1600, in Madrid, where his father was employed in the department of the treasury; was educated at the Jesuit college in that city, and tradition says, as it did of Cervantes, that he studied for a time in Salamanca. His first play was written at the age of 13, and at 22 he won a prize in a poetical contest which called forth warm praise from Lope de Vega. Ten years of

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military service followed, in Italy and Flanders, though there is some discrepancy in dates. But in 1635 he is once more in Madrid, writing for the stage. Two years later he received the Order of Santiago, and in 1648 had to interrupt the composition of a play in order to join his fellow knights in a campaign against he Calatan rebels. In 1651 he followed the example of Lope de Vega and entered the priesthood, becoming successively chaplain at Toledo, honorary chaplain to Philip IV., and superior of the Brotherhood of San Pedor in Madrid. Yet he still continued to write for the stage, and when he died, May 5, 1681, he was engaged upon a new *auto sacramental*, a form of religious play in which he excelled all his predecessors. His friend De Solis wrote of him, "He died, as they say the swan dies, singing."

With Calderon the golden period of Spanish drama comes to a close. He found it at its height, and he exhausted, one after another, the possibilities of its several types. As to the rank which should be assigned him, it must be borne in mind that he wrote not for the world, but for the narrow circle of his own age and country. He was essentially, fundamentally local; he lacked the universality, the wide humanity of Shakespeare, to whom, curiously enough, Friedrich Schlegel found him superior. He lacked the gift of finely differentiating his characters. They stand less for individuals than for personifications of certain primitive and dominant passions, love, hate, pride, charity, revenge. His leading motives are limited in number; they almost narrow down to the three sentiments of loyalty to the King, devotion to the Church and the 'point of honor,' or vengeance inflicted by husband, father, or brother upon an erring woman. Perhaps nothing serves better to illustrate his circumscribed outlook upon life than the plays in which this last theme is treated. His heroes have nothing of the lofty passion of an Othello, the sublimity of a noble nature gone astray. They impress one rather as cold-blooded executioners, sensitive only to the fear of being made to appear absurd. There is much significance in the fact that of all the surviving plays of Calderon, only three have been found capable of production on the modern stage.

Many critics think that Calderon was at his best as a writer of *autos*, or religious plays, which closely resemble the mystery plays of the Middle Ages, and in their more specialized form are a sort of dramatized exposition of the mystery of the blessed eucharist, intended for performance on Corpus Christi day. Of these *autos*, nearly eighty are extant, although the number varies in different authorities, who sometimes fail to distinguish between the *auto* and the more secular *comedia devota*. Of the regular dramas, there are about 120 surviving, of which the best known are *El Alcalde de Zalamea; El principe constante* (an historical play dealing with Prince Ferdinand of Portugal); *La dama duendo* (The Fairy Lady); *El médico de su honra; El pinto de su deshonra;* and *El mayor mostruo los zelos* (No Monster Like Jealousy).

Editions of Calderon are: Keil's (Leipzig, 1827); Hartzenbusch's (Madrid, Rivadeneyra, 4 vols, 1872-74); and Garcia Ramen (Madrid, 1882); a German translation of the plays, by J. D. Gries (9 vols., Berlin, 1862). There are English translations of selected plays by M'Carthy (1854-73); Edward Fitzgerald (3 vols., 1853); Archbishop Trench (1856); and N. MacColl (1888). Consult: Schmidt, *Die Schauspiele Calderons* (Elberfeld, 1857); Trench, *Essay on the Life and Genius of Calderon* (London, 1880); Menendez y Pelayo, *Calderon y su teatro* (Madrid, 1881); Günthner, *Calderon und seine Werke* (Freiburg, 1888).

CALDERON THE COURTIER. A story of Spanish romance by Bulwer Lytton (1838).

CALDERWOOD, kąl'dĕr-wud, DAVID (1575-1650). A Scottish divine and ecclesiastical historian. He was born in Dalkeith, of a good family, and about 1604 was settled as Presbyterian minister of Crailing, Roxburghshire, a few miles southeast of Edinburgh. Opposed to the designs of James VI. for the establishment of Episcopacy in Scotland, on that monarch's visit to his native country in 1617, he and other ministers signed a protest against a bill, then before the Scottish Parliament, for granting the power of framing new laws for the Church to an ecclesiastical council appointed by the King, and in consequence he was summoned before the high commission of Saint Andrews. Refusing to submit, he was committed to prison for contumacy, and then banished the kingdom. He retired to Holland, 1619, and in 1621, in English, and in 1623, in Latin, published at Leyden, under the pseudonym Edwardus Didoclavius, an anagram on his name, Latinized, his celebrated controversial work, entitled *Altare Damascenum*, etc., in which he rigorously examined the origin and authority of Episcopacy, and which has been a storehouse of information and argument in favor of Presbyterianism. After King James's death, in 1625, he returned to Scotland, and for some years was engaged collecting all the memorials relating to the ecclesiastical affairs of Scotland, from the beginning of the Reformation there to the death of James VI. In 1640 he became minister of Pencaitland, near Edinburgh, and in 1643 was appointed one of the committee for drawing up the Directory for Public Worship in Scotland. He died at Jedburg, October 29, 1650. From the original MS. of his *History of the Kirk of Scotland*, preserved in the British Museum, an edition, with a life, by the Rev. Thomas Thomson, was printed for the Woodrow Society, in 8 vols. (Edinburgh, 1842-49).

CALDERWOOD, HENRY (1830-97). A Scotch clergyman and philosopher, born at Peebles. He was educated at Edinburgh University in 1847-52, studied theology, 1852-56, and was minister of Greyfriars Presbyterian Church, Glasgow, in 1856-58. He was examiner in mental philosophy at the University of Glasgow from 1861 to 1864, and from 1868 until his death was professor of moral philosophy at Edinburgh University. He published *The Philosophy of the Infinite* (1854); *Handbook of Moral Philosophy* (1872); *The Relations of Mind and Brain* (1879); *The Relations of Science and Religion* (1881); and *Evolution and Man's Place in Nature*.

CALDICOTT, kąl'dĭ-kot, ALFRED JAMES (1824—). An English musician and composer, born in Worcester. He studied at the Leipzig Conservatory under Richter, Moscheles, and others: became organist of Saint Stephen's Church, Worcester, and in 1882 was appointed to a professorship at the Royal College of Music, London. His

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works include many songs and glees; the cantatas *The Widow of Nain* (1881) and *A Rhine Legend* (1883); and the operettas *A Moss-Rose Rent* (1883) and *Old Knockles* (1884).

CALDIERO, kȧl-dyā'rō (anciently Lat. *Caldarium*, hot baths, from *calidus*, warm). A decayed town in north Italy, 8 miles east of Verona. Its hot sulphur springs were known to the Romans, hence the name Caldarium (Map: Italy, 2). Here on November 12, 1796, the Austrians repulsed Napoleon, and on October 29-31, 1805, a series of bloody battles between the Austrians under Archduke Charles and the French under Masséna occurred.

CALDWELL, kąld'wĕl. A town and county-seat of Warren County, N. Y., 62 miles north of Albany, the terminus of a branch of the Delaware and Hudson Railroad (Map: New York, G 2). A picturesque location, at the southern end of Lake George, amid mountain scenery, vies with historical associations in making the locality popular as a summer resort. Forts George and William Henry were located here. Population, in 1890, 1377; in 1900, 1465.

CALDWELL. A village and county-seat of Noble County, Ohio, 35 miles north of Marietta, on the Cleveland and Marietta and the Bellaire, Zanesville and Cincinnati railroads (Map: Ohio, H 6). It is a coal and iron mining, and oil-producing region. Population, in 1890, 1248; in 1900, 927.

CALDWELL. A town and county-seat of Burleson County, Tex., about 85 miles east by north of Austin, on the Gulf, Colorado and Santa Fé Railroad (Map: Texas, F 4). It has a trade in the products of an agricultural and stock-raising region, and contains brick-yards, cotton-gin, grist and oil mills, marble-works, etc. Population, in 1890, 1250; in 1900, 1535.

CALDWELL, Charles Henry Bromedge (1823-77). An American naval officer. He was born in Hingham, Mass., and entered the United States Navy in 1838. He took part in the bombardment of Forts Jackson and Saint Philip in 1862, and commanded the mortar flotilla in the operations at Port Hudson in 1863. In 1870 he became chief of staff in the North Atlantic Squadron. He reached the grade of commodore in 1874.

CALDWELL, James (1734-81). An American clergyman, best known as 'the soldier's parson.' He was born in Virginia, graduated at Princeton in 1759, became pastor of the Presbyterian Church at Elizabethtown, N. J., in 1762, and was a zealous patriot during the Revolution. In 1780 the Tories burned his house and church, and soon afterwards a British force from Staten Island fell upon the village of Connecticut Farms (now Union, N. J.), where Caldwell's wife and children had taken refuge, and murdered his wife while she was praying with her children. The story is told of Caldwell's distributing hymn-books to some soldiers who were short of wadding, with the exhortation, "Now, boys, put Watts into them." He was shot and killed by a patriot sentinel during a dispute about a package that the soldier declared it his duty to examine. The soldier was tried by the civil authorities for murder, and was convicted and executed. A fine monument to Caldwell was dedicated at Elizabethtown on the sixty-fourth anniversary of his death.

CALDWELL, Samuel Lunt (1820-89). An American educator. He was born in Newburyport, Mass., and graduated from Waterville (now Colby) College in 1839, and from Newton Theological Institution in 1845. He held pastorates in Bangor, Maine, and Providence, R. I., for twenty-seven years, and was professor of Church history at the Newton Seminary from 1873 to 1878. He then became second president of Vassar College, succeeding Dr. J. H. Raymond, and held this position until 1885.

CA'LEB (dog). The name both of an individual and of a Kenizzite clan, mentioned in I. Sam. xxv. 3; Num. xxxii. 12; Judges i. 15; I. Chron. ii. 9 *al.* It was probably of Edomitish origin. Before the time of David (c.1033-993 B.C.), it was established in Hebron and its neighborhood. Caleb ben Jephunneh is the eponymous hero of the clan, representing its advance from Arabia into the Negeb. In the story of the spies, Num. xiii. 6, it even represents Judah. Post-exilic genealogies connect Caleb closely with Jerahmeel, as a younger brother, and both through Hezzron and Perez with Judah. It is possible that these genealogies reflect vaguely the outlines of a history, of which northwestern Arabia and the Negeb were the scenes, before the different elements were welded together into the kingdom of Judah by David.

CALEB. (1) The foster-mother of Saint George in the *Seven Champions of Christendom.* (2) A caricature of Lord Grey of Wark, in Dryden's *Absalom and Achitophel.*

CALEB WILLIAMS. A novel by William Godwin, published in May, 1794. It is a study in the relativity of ethics. For the plot, see Falkland. It was dramatized by Colman the Younger. See Iron Chest, The.

CAL'EDO'NIA (Lat., Gk. Καληδονία, *Kalēdonia*, still retained in Cymr. *Coed Celyddon*, Caledonian Forest). The name given to the northern part of Britannia, beyond the firths of Forth and Clyde, by Tacitus and the later Romans. The derivation is very uncertain. Agricola attempted the conquest of Caledonia, which he invaded in A.D. 80 and the following years. In 84 he defeated Galgacus, who had formed a union of all the tribes, but was prevented, by his recall, from pursuing the conquest. Later Hadrian, Septimius Severus, and others attempted to subdue Caledonia, but the inhabitants succeeded in maintaining their independence. The natives made constant incursions into Britain. In the Fourth and Fifth centuries, under the names of Scots and Picts (q.v.), they preyed upon the Britons, especially after the withdrawal of the Roman legions, until the island was occupied by the Angles and Saxons. See Britannia, and Scotland.

CALEDONIA, New. See New Caledonia.

CAL'EDO'NIAN CANAL. A chain of natural lakes in Scotland, 62 miles long, united by artificial canals and traversing the Great Glen of Albin, in Invernesshire, from northeast to southwest, and connecting the North Sea with the Atlantic. The lakes are Beauly, Ness, Oich, Lochy, Eil, and Linnhe (Map: Scotland, D 2). They communicate by cuts 120 feet broad at the surface, 50 feet at the bottom, and 17 feet deep, the total length of these artificial channels being 23 miles. The canal was formed to avoid dangerous and tedious navigation by the Pentland

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Firth, Cape Wrath, and the Hebrides; the distance between Kinnaird's Head and the Sound of Mull by this route being 500 miles, but by the canal 250, with an average saving of 9½ days for sailing vessels. The highest part is Loch Oich, 105 feet above the sea. There are 28 locks, each 170 to 180 feet long, and 40 feet wide, with a rise or lift of water of 8 feet. Eight of the locks, called Neptune's staircase, occur in succession near the west end of the canal. Begun under Telford, in 1803, the canal was opened in 1823. Ships of 500 to 600 tons can pass through. It is chiefly used by fishing-boats and for local traffic, and in the summer season is much frequented by tourists attracted by the picturesque scenery and points of interest on both sides of the canal.

CAL'EDO'NIA SPRINGS. A health resort in Prescott County, Ontario, Canada, about 10 miles southwest of Original, and 60 miles nearly due west of Montreal (Map: Quebec, C 5). It is famous for its alkaline springs.

CA'LEF, or **CALFE,** ROBERT (c.1648-1719). A Boston merchant, who published, in 1700, *More Wonders of the Invisible World,* a satirical reply to Cotton Mather's *Wonders of the Invisible World* (1692). His argument against the witchcraft persecutions and his attack on Mather called out from the latter's parishioners, in defense of their pastor, *Some Few Remarks upon a Scandalous Book Against the Government and Ministry of New England.* Calef's book was also publicly burned at Cambridge by order of Increase Mather, then president of Harvard College.

CALENDAR (Lat. *calendarium,* account-book, interest falling due on the calends, from *calendæ,* calends). The mode of adjusting the months and other divisions of the civil year to the natural or solar year. The necessity of some division and measurement of time must have been early felt. The phases or changes of the moon supplied a natural and very obvious mode of dividing and reckoning time, and hence the division into months (q.v.; see also WEEK) of 29 or 30 days was, perhaps, the earliest and most universal. But it would soon be observed that, for many purposes, the changes of the seasons were more serviceable as marks of division; and thus arose the division into years (q.v.), determined by the motions of the sun. It was soon, however, discovered that the year, or larger division, did not contain an exact number of the smaller divisions or months, and that an accommodation was necessary; and various not very dissimilar expedients were employed for correcting the error that arose. The ancient Egyptians had a year determined by the changes of the seasons, without reference to the changes of the moon, and containing 365 days, divided into twelve months of 30 days each, with five supplementary days at the end of the year. The Jewish year consisted, in the earliest periods, as it still does, of twelve lunar months, a thirteenth being from time to time introduced, to accommodate it to the sun and seasons. This was also the case with the ancient Syrians, Macedonians, etc. The Jewish months have alternately 29 and 30 days; and in a cycle of 19 years there are 7 years having the intercalary month, some of these years having also one, and some two days more than others, so that the length of the year varies from 353 to 385 days. The Greeks, in the most ancient periods, reckoned according to real lunar months, twelve making a year; and about B.C. 594 Solon introduced in Athens the mode of reckoning alternately 30 and 29 days to the month, accommodating this civil year of 354 days to the solar year by occasional introduction of an intercalary month. A change was afterwards made, by which three times in 8 years a month of 30 days was intercalated, making the average length of the year 365¼ days. See METONIC CYCLE.

The Romans are said to have had originally a year of 10 months; but in the time of their kings they adopted a lunar year of 355 days, divided into 12 months, with an occasional intercalary month. Through the ignorance of the priests, who had the charge of this matter, the utmost confusion gradually arose, which Julius Cæsar remedied (B.C. 46) by the introduction of the Julian Calendar, according to which the year has ordinarily 365 days, and every fourth year is a leap year of 366 days—the length of the year being thus assumed as 365¼ days, while it is in reality 365 days, 5 hours, 48 minutes, and 46 seconds; or 11 minutes, 14 seconds less. Cæsar gave the months the number of days they still have. See CALENDS.

So perfect was the Julian style of reckoning that it prevailed generally among Christian nations, and remained undisturbed till the accumulation of the remaining error of 11 minutes or so had amounted, in 1582, to 10 complete days, the vernal equinox falling on the 11th instead of the 21st of March, as it did at the time of the Council of Nice, A.D. 325. This shifting of days had caused great disturbances, by unfixing the times of the celebration of Easter, and hence of all the other movable feasts. And accordingly, Pope Gregory XIII., after careful study, with the aid of Clavius, the astronomer, ordained that 10 days should be deducted from the year 1582, by calling what, according to the old calendar, would have been reckoned the 5th of October the 15th of October, 1582; and, in order that this displacement might not recur, it was further ordained that every hundredth year (1800, 1900, 2100, etc.) should not be counted a leap year, excepting every fourth hundredth, beginning with 2000. In this way the difference between the civil and natural year will not amount to a day in 5000 years. In Spain, Portugal, and part of Italy, the Pope was exactly obeyed. In France the change took place in the same year, by calling the 10th the 20th of December. In the Low Countries the change was from the 15th December to the 25th; but it was resisted by the Protestant part of the community till the year 1700. The Catholic nations, in general, adopted the style ordained by their sovereign pontiff; but the Protestants were then too much inflamed against Catholicism in all its relations to receive even a purely scientific improvement from such hands. The Lutherans of Germany, Switzerland, and, as already mentioned, of the Low Countries, at length gave way in 1700, when it had become necessary to omit 11 instead of 10 days. A bill to this effect had been brought before the Parliament of England in 1585, but does not appear to have gone beyond a second reading in the House of Lords. It was not till

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751, and after great inconvenience had been experienced for nearly two centuries, from the difference of the reckoning, that an act was passed (24 Geo. II., 1751) for equalizing the style in Great Britain and Ireland with that used in other countries of Europe. It was then enacted that 11 days should be omitted after the 2d of September, 1752, so that the ensuing day should be the 14th. A similar change was about the same time made in Sweden and Tuscany, and Russia is now the only country which adheres to the old style; an adherence which renders it necessary, when a letter is thence addressed to a person in another country, that the date should be given thus: April $\frac{1}{13}$ or $\frac{\text{June 27}}{\text{July 9}}$. It will be observed that the year 1800, not being considered by us as a leap year, has interrected another, or twelfth, day between old and new style.) See CHRONOLOGY; DATE.

FRENCH REVOLUTIONARY CALENDAR. The French nation, in 1793, undertook the task of making a new calendar, professedly upon philosophical principles. The new era was dated from the minute of the autumnal equinox (September 22, 1792), which was also the day from which the existence of the Republic was reckoned (although the formal proclamation of the Republic was on September 21). There were 12 months of 30 days each, divided into decades, in which the days were named numerically—Primidi, Duodi, and so on, up to Decadi. The remaining five days were grouped as festal days at the end of the year, and known as *Sansculottides*. The months, seasons, and festivals were arranged as follows (the table being for the years I., II., III., V., VI., VII., the dates varying by one or two days in the remaining years):

AUTUMN.

Vendémiaire	Vintage month	22 Sept to 21 Oct.
Brumaire	Fog month	22 Oct. to 20 Nov.
Frimaire	Sleet month	21 Nov. to 20 Dec.

WINTER.

Nivôse	Snow month	21 Dec. to 19 Jan.
Pluviôse	Rain month	20 Jan. to 18 Feb.
Ventôse	Wind month	19 Feb. to 20 Mar.

SPRING.

Germinal	Seed month	21 Mar. to 19 April
Floréal	Blossom month	20 April to 19 May
Prairial	Pasture month	20 May to 18 June

SUMMER.

Messidor	Harvest month	19 June to 18 July
Fervidor, or Thermidor	Heat month	19 July to 17 Aug.
Fructidor	Fruit month	18 Aug. to 16 Sept.

SANSCULOTTIDES, OR FEASTS DEDICATED TO

Les Vertus	The Virtues	17 Sept.
Le Génie	Genius	18 Sept.
Le Travail	Labor	19 Sept.
L'Opinion	Opinion	20 Sept.
Les Récompenses	Rewards	21 Sept.

A sixth additional day in leap years was named *le jour de la Révolution*. This calendar was a product of the revolt against Christianity, and it existed until the old system was restored by Napoleon, December 31, 1805. See CHRONOLOGY.

PERPETUAL CALENDAR. An arrangement for ascertaining the day of the week corresponding to any desired date, and for solving other similar problems. The following form of perpetual calendar was arranged by Capt. J. Herschel, and is probably the best yet devised. As here given, it covers the period from 1798 to 1950, but it can be extended easily in either direction.

Every date is composed of four elements, viz.:

(1) Day of the week.
(2) Day of the month.
(3) Name of the month.
(4) Number of the year.

Any three of these elements being given, we can find the fourth from the perpetual calendar. Thus, suppose we wish to find what day of the week corresponded to March 4, 1865, on which day Lincoln was inaugurated President of the United States for the second time. Entering the calendar in the column headed 'March,' and opposite the 'day of the month' 4, we find the sign +. Now, entering the column containing the year 1865, and going up it to the same sign +, we find opposite that sign, on the right, the 'day of the week' Saturday. Accordingly, Lincoln was inaugurated on a Saturday.

Again, suppose it is required to find in what years

PERPETUAL CALENDAR

DAY OF THE MONTH					Jan. Oct.	Apr. July *Jan.*	Sept. Dec.	June	Feb. Mar. Nov.	Aug. *Feb.*	May	
1	8	15	22	29	×	+	=	•	‖	‡	§	Monday
2	9	16	23	30	§	×	+	=	•	‖	‡	Tuesday
3	10	17	24	31	‡	§	×	+	=	•	‖	Wednesday
4	11	18	25	32	‖	‡	§	×	+	=	•	Thursday
5	12	19	26		•	‖	‡	§	×	+	=	Friday
6	13	20	27		=	•	‖	‡	§	×	+	Saturday
7	14	21	28		+	=	•	‖	‡	§	×	Sunday
					1798	1799	1800	1801	1802	1803	.....	
					1804	1805	1806	1807	.....	1808	1809	
					1810	1811	.....	1812	1813	1814	1815	
					.....	*1816*	1817	1818	1819	.....	*1820*	
					1821	1822	1823	.....	*1824*	1825	1826	
					1827	.....	*1828*	1829	1830	1831	.....	
					1832	1833	1834	1835	.....	*1836*	1837	
					1838	1839	.....	*1840*	1841	1842	1843	
					.....	*1844*	1845	1846	1847	.....	*1848*	
					1849	1850	1851	.....	1852	1853	1854	
					1855	.....	*1856*	1857	1858	1859	.....	
					1860	1861	1862	1863	.....	*1864*	1865	
					1866	1867	.....	*1868*	1869	1870	1871	
					.....	*1872*	1873	1874	1875	.....	*1876*	
					1877	1878	1879	.....	*1880*	1881	1882	
					1883	.....	*1884*	1885	1886	1887	.....	
					1888	1889	1890	1891	.....	*1892*	1893	
					1894	1895	.....	*1896*	1897	1898	1899	
					1900	1901	1902	1903	.....	*1904*	1905	
					1906	1907	.....	1908	1909	1910	1911	
					.....	*1912*	1913	1914	1915	.....	*1916*	
					1917	1918	1919	.....	*1920*	1921	1922	
					1923	.....	*1924*	1925	1926	1927	.....	
					1928	1929	1930	1931	.....	*1932*	1933	
					1934	1935	.....	*1936*	1937	1938	1939	
					.....	*1940*	1941	1942	1943	.....	*1944*	
					1945	1949	1947	.....	*1948*	1949	1950	

NOTE

The *italic* months are for use in bissextile years only. No attention need be paid to leap years, unless the date falls in January or February.

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March 4 (inauguration day) can fall on a Sunday. As before, for March 4 we find the sign +. Opposite Sunday we find that sign in the first column of years, beginning with 1798, 1804, etc. In all the years in this column, therefore, March 4 will fall on a Sunday. But Presidential inaugurations usually occur only in years following leap years, which latter are indicated by *italics* in the perpetual calendar. Consequently, Sunday inaugurations occurred in 1821, 1849, 1877, and will occur in 1917, 1945.

PRIMITIVE CALENDAR. Among Amerind tribes, inchoate writing in the form of a rude inscription, sometimes called 'winter count,' recording notable events in the life of an individual or the history of a tribe. The woodland tribes made the inscriptions on trees or on birch bark; dressed skins were used by the tribes of the prairies; some of the tribes of the arid regions (e.g. the Prina) incised rude mnemonic symbols on canes or wands; while in Mexico and Yucatan calendric inscriptions of related character, although recorded in more or less arbitrary glyphs, rather than rude ideographs or ikonographs, were preserved in scrolls or books of maguey paper. See ARCHÆOLOGY, AMERICAN; and MAN, SCIENCE OF.

CALENDAR. In general, an orderly list of things, especially with reference to dates, or of events. Specifically:

CALENDAR OF COURT, the official list of causes pending in the court for trial or argument. It generally contains the names of the parties and of their attorneys, as well as the date and nature of the issue, i.e. whether of fact or of law. Ordinarily, the causes are entered in the order of their date of issue (q.v.), the first one being that in which issue has been joined the longest; but the statutes and court rules give precedence to some cases over others. Certain actions brought by the United States or by a State may be advanced and tried out of their chronological order. Criminal cases are entitled to a preference over civil suits, and among criminal cases those for capital offenses have precedence over others.

CALENDAR OF PRISONERS. In England, a sheriff's certified list of all prisoners in his custody awaiting trial for felony, prepared for a court sitting under a commission of jail delivery (q.v.). In the United States similar lists are often required, either of the sheriff or of the keeper of a prison.

CALENDERING (Fr. *calandre*, roller, from Lat. *cylindrus*, Gk. κύλινδρος, *kylindros*, cylinder, roller). The term applied to the finishing process by which a glazed or polished surface is given to paper and various textile fabrics, such as linen and cotton. It is usually done by passing the fabric between cylinders or rolls under pressure, hence the origin of the term which is a corruption of cylindering. The familiar domestic process of starching and ironing illustrates in a simple form the object and result of calendering, and the common domestic mangle is a near approach in a simple form of the large calendering machines used in paper and textile manufacture. These machines consist of a series of from three to twelve rolls or 'bowls' set one above the other in a strong iron frame and so arranged that heavy pressures can be brought to bear on the rolls, and, therefore, on the fabric which is passed between them. The rolls were formerly made of wood, but this material proved unsatisfactory because it warped. At present, when metal rolls are not used, the rolls are made of paper or cotton rendered solid by hydraulic pressure. Metal rolls are made of steel, chilled cast iron, or brass, and are often made hollow, to allow them to be heated internally where hot calendering is required. The process of calendering consists in passing the fabric between the rolls a number of times, depending upon the material and the finish required. Often cloths are starched before being calendered. To impart a glaze or polish one of the pair of rolls is made to revolve faster than the other, which causes it to slide on the fabric, with exactly the same effect as results from the sliding back and forth of the flatiron in 'ironing' or polishing the domestic linen. Sometimes the surfaces of the rolls have slightly raised patterns which produce the effect known as watering. In making the rolls for calendering the utmost accuracy of workmanship is exercised to secure a truly cylindrical surface; metal rolls are turned on a lathe, then ground and finally polished. Great care has also to be taken in setting the rolls in the frame and in adjusting them to each other. The method of applying the pressure is by using weights or by hydraulic presses, or by means of screws, the former being preferable where heavy pressures are required. See BEETLING.

CALENDERS, THE THREE. Three one-eyed dervishes in *The Arabian Nights*. They are disguised as beggars, but turn out to be princes.

CAL'ENDS. See KALENDS.

CALENTURA, kä'lên-tōō'rä (Sp., from Lat. *calere*, to glow, to be hot). A medical term formerly applied to a tropical fever with acute delirium, never fully described, but supposed to attack sailors in hot climates. The word was revived during the Spanish-American War, as applied to a prevalent fever in Cuba and the Philippine Islands; also called Cuban fever. It it said to begin without prodromal symptoms, a chill and a temperature of 103° F. ushering in the disease. The temperature is likely to rise higher; muscular pains supervene, with headache, loss of appetite, nausea, and marked weakness. Many cases recover spontaneously in a week. Calomel, followed by a saline cathartic, is given with success. Quinine is said to possess no efficacy.

CALEPINE, käl'e-pēn, SIR. A knight in Spenser's *Faerie Queene*. The most notable of his feats is the slaying of a bear with his hands alone.

CALEPINO, kä'lä-pē'nô, AMBROGIO (1435-1511). An Italian lexicographer. He was an Augustine monk, and devoted his entire life to the making of a polyglot dictionary. The first edition appeared in 1502; the Aldi published eighteen editions of it in a half-century (1542-92). That of 1590 comprises eleven languages, some of them added by Passerat and others. The word *Calepinus* came to mean 'a dictionary.'

CAL'GARY. A city in the Province of Alberta, Canada, and the centre of a large stock-raising region, on the Canadian Pacific Railroad, 2264 miles west of Montreal, and 838 miles west of Winnipeg (Map: Northwest Territory, G 4). It was incorporated in 1885, having been a Hudson Bay post prior to the construction of the railroad. It lies on a beautiful plateau nearly

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urrounded by Bow and Elbow rivers, and backed n three sides by lofty hills above which are seen he Rocky Mountains. It is an important distributing point for freight and the chief supply tation for the mountain mining districts. It hips large quantities of cattle, sheep, and horses, nd has a large trade in furs and hides. Its ndustries include the railway works of the Canadian Pacific Railroad, leather-making, soapvorks, and brewing. The town is largely built of a light-gray stone. It contains churches, banks, good hotels, and schools, some costly public and private buildings, water-works, electric ights, and a good sewer system. It is one of he chief stations of the Northwest Mounted Police. The large Sarcee Indian Reserve lies to he southwest of the town. Population, in 1891, 1876; in 1901, 4866. Consult *Calgary Alberta* (Calgary, 1900).

CALHOUN, kăl-hōōn', JOHN CALDWELL (1782-1850). An American statesman, of Scotch-Irish descent, and Vice-President of the United States. He was the third son of Patrick and Martha (Caldwell) Calhoun, and was born in the Abbeville District (now county), South Carolina, March 18, 1782. Though early of a meditative disposition, he had, owing to the moderate circumstances of his family, little regular schooling, and he was 18 before he began the systematic study under his brother-in-law which fitted him in 1802 to enter the junior class at Yale. He graduated in 1804 with high honors, and then having studied law, partly in Charleston, he began to practice in Abbeville in 1807. He was soon sent to the State Legislature, and in 1811 was elected to Congress—the same year marrying a second cousin, Floride Calhoun, who had a moderate fortune. He sided with Clay and the war party in Congress, and on account of his strong personality came quickly to the front. He was distinctly nationalistic in his politics at this time, laying himself open to a charge of inconsistency when he later became a leader of the strict constructionists. In 1816 he was in favor of a national bank, advocated a strengthening of the navy for defense, and favored, as a means of binding together the widely spread Republic, not only internal improvements in the shape of permanent roads, but also a protective tariff. Calhoun became Secretary of War in Monroe's Cabinet in March, 1817, showing marked ability in the administration of a department then in the utmost disorder. He prepared, at the request of the House, a noteworthy report on roads and canals, and drew up one on Indian affairs which has received great praise. The army was reduced, and Calhoun's reorganization of it proved so satisfactory that his system was adhered to by his successors. In 1820 he favored the Missouri Compromise. He was now mentioned as a candidate for the Presidency, but General Jackson proved more popular, and Calhoun was elected Vice-President in 1824, with the support of the two principal parties. Turning to Jackson's side, in opposition to Adams, he was again elected in 1828. The passing of the 'Tariff of Abominations' of 1828, the protective features of which bore hard on the agricultural State of South Carolina, was the occasion of Calhoun's preparing a paper setting forth the claims of State sovereignty. This document was issued by the Legislature of his State, and is known as the "South Carolina Exposition." A definite break with Jackson followed the President's discovery that Calhoun had sought to call him to account for his course in the Seminole War. Then, when Jackson tried, with the aid of Martin Van Buren, to reinstate in Washington society the notorious Mrs. Eaton, Calhoun refused to cooperate with him, thus widening the breach. Jackson's hold on the people was so great that he could dictate his successor, and Calhoun's chances of becoming President were now gone. When Calhoun became convinced that the repeal of the protective tariff could not be secured through Jackson, he published, July 26, 1831, a manifesto, carrying on the argument of the "Exposition," repeating his arguments for free trade, and asserting the right of the States to nullify such Federal laws as they considered unconstitutional. South Carolina regarded the tariff modifications of 1830 as being a compromise in fact, but a reassertion of the principle of protection. On August 28, 1832, Calhoun wrote to Governor Hamilton, of South Carolina, giving the final statement of his doctrine, asserting that "there is no direct and immediate connection between the individual citizens of a State and the general Government," and that "the great conservative principle" of union is nullification. When the South Carolina convention, on November 24, 1832, passed an ordinance nullifying the tariff, Calhoun immediately resigned the Vice-Presidency and entered the Senate. By a compromise, engineered by Clay, a conflict was avoided; South Carolina won the particular point as to the tariff, but failed to secure the establishment of nullification as a principle. Acting with the Whigs, but still independent, Calhoun now became a scathing critic of Jackson's administration, though never allowing personal animus to appear; he condemned severely Jackson's removal of the public Government deposits from the United States National Bank, and his development of the spoils system. Foreseeing more clearly than any one else the conflict between the North and the South on the slavery question, he sought to avert it by checking all discussion of the issue. When, after the financial crisis of 1837, Van Buren proposed the "sub-treasury scheme," by which the United States avoids all connection with banks and controls its own deposits, Calhoun supported the President, much to the chagrin of the Whigs, with whom he had been acting. He was in favor of Van Buren's reëlection, and secured for him the vote of South Carolina. When Tyler, who became President on the death of Harrison, vetoed the bill for rechartering the United States Bank, Calhoun defended him; he denounced the tariff of 1842 and supported the Webster-Ashburton treaty. After having declined reëlection to the Senate in 1843, he was, in March of the next year, through a clever move on the part of Henry A. Wise, appointed Secretary of State by Tyler, and was chiefly instrumental in bringing about the annexation of Texas, in order to extend slave territory, thus practically necessitating a war, which he strove later to avert. In 1845 he was again in the Senate. In order to check the anti-slavery movement at the North, he proposed in 1847 a convention of Southern States, to prevent Northern commerce from entering their ports. Slavery he had come to advocate as a positive good. In 1849 he proposed a Southern convention, to set forth the grievances

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of the slavery side, looking toward "dissolving the partnership," if the only course left open seemed submission. His famous last speech in connection with the Compromise of 1850 was read, on account of his weakness, by another Senator. In this he asserted that an amendment to the Constitution would be necessary to restore equilibrium. He died March 31, 1850, having spent his last few months in writing his "Disquisition on Government," and his "Discourse on the Constitution and Government of the United States," probably the most remarkable discussions of the rights of minorities ever written.

Calhoun's personality was attractive and his morals were irreproachable. His power of logical analysis, though perverted, seems to entitle him to rank as our most original political theorist; he was probably too much of a doctrinaire to be held a statesman of the first order. It must be conceded, however, that throughout his long political career he impressed both friends and foes as only a man of extraordinary powers can do, and it is quite clear that he really believed that the only way to preserve the Union, which he dearly loved, was to reduce its strength almost to the vanishing point. Consult: *Life*, by Jenkins (1851), and by Von Holst (1882); Benton, *Thirty Years' View* (1854); *Calhoun's Collected Works* (6 vols., 1853-54); and his correspondence, edited by J. F. Jameson (1900).

CALHOUN, kăl-hōōn', SIMON HOWARD (1804-76). An American missionary. He was born in Boston; graduated from Williams College in 1829, and went as missionary to the Levant and later to Syria, where he labored with great success till his return in 1874. He was an authority on the Arabic and Turkish languages, and assisted in making the first translation of the Bible into Turkish.

CALÍ, kä-lē'. A city of Colombia, in the Department of Cauca (Map: Colombia, B 3). It is situated on the Calí, near its junction with the Rio Cauca, 3100 feet above sea-level, and contains the fine Ionic Church of San Francisco and a college. A noteworthy bridge crosses the Rio Calí at this point. The city is of considerable commercial and industrial importance, and is well equipped with business facilities: bank, telegraph, Government post-office, etc. Calí was founded in 1556. Population, about 12,000.

CAL'IBAN. (1) A deformed monster in Shakespeare's *Tempest*. He is the son of the witch Sycorax and a devil, and originally laid claim to the sovereignty of the enchanted isle. Prospero soon obtained complete mastery over his small mind, however, and has made a servant of him at the beginning of the play.

(2) A cynical philosophic drama by Ernest Renan (q.v.), published in 1878. It professes to take up the story of Caliban from where he is left in Shakespeare's *Tempest*.

(3) The *nom de plume* of Emile Bergerat.

CALIBAN UPON SET'EBOS, or NATURAL THEOLOGY ON THE ISLAND. A characteristic psychological poem by Robert Browning. In it Shakespeare's amorphous creature, Caliban, discourses 'touching that other, whom his dam called God.' The text, "Thou thoughtest that I was altogether such a one as thyself," is a subtly ironical comment on the savage's words.

CALIBO, kä-lē'bō. A town of Panay, Philippines, in the Province of Capiz, situated on the northern coast of the island, 40 miles west of Capiz. Population, in 1898, 10,815.

CALIBRE (Fr., perhaps from Lat. abl. sing. *qua libra*, of what weight, measure). The calibre of a smooth-bore gun is the diameter of the bore. The calibre of a modern rifle of ordinary type is the diameter of a cylinder which will just touch the highest points of all the *lands* (the part of the surface of the bore between the grooves). In the case of rib-rifled guns, which have relatively very narrow lands, the calibre is the diameter of a cylinder which would just touch the bottom of all the grooves. The old smooth-bore cannon were designated by the weight of the shot they threw, as 24-pounder, 68-pounder, etc.; modern rifled cannon are described by the calibre, such as 10-inch, etc. The length of a piece is now designated by the number of calibres; for example, a 12-inch gun 40 calibres long is 40 feet in length, etc. See ARTILLERY; GUNS, NAVAL; ORDNANCE; PROJECTILES; and SMALL ARMS.

CAL'IBURN. Another name of King Arthur's sword Excalibur.

CALICOBACK, or CALICO-BIRD. See TURNSTONE.

CALICO BASS (possibly so called because of its variegated color). A sunfish-like, mottled-olive bass (*Pomoxys sparoides*) of the whole Mississippi Valley and Great Lakes, highly prized as a food-fish and as game for youthful anglers. It reaches a length of 12 inches, weighing 2 pounds, haunts grassy streams and ponds, and bears transplanting well. It is a near relative of the crappie (q.v.), and is also known as grass-bass, strawberry-bass, and bar-fish. For illustration, see Plate of FRESH-WATER BASS.

CALICO-BUSH. See KALMIA.

CALICO-PRINTING. See TEXTILE PRINTING.

CAL'ICUT (Hind. *kolikodu, kolikotta*). A seaport of the Malabar District, British India, in latitude 11° 15' N., and longitude 75° 50' E., 566 miles south-southeast of Bombay, on the Indian Ocean and at the terminus of the southwest branch of the Madras Railway (Map: India, C 6). It was the first spot in India visited by Covilham (1486), and it was here that Vasco de Gama reached the shores of India in 1498, having come by the way of the Cape of Good Hope. Calicut was at that time prosperous and powerful. It twice repulsed the Portuguese, slaying their commander in 1509. It stands near the mouth of a small river of the same name, and possessed at one time a good haven. Now its anchorage is merely an open roadstead. Aside from this physical disadvantage, the ravages of war and the competition of superior localities contributed to the decay of Calicut. In 1792, when it fell into the hands of the English, the city was little better than a ruin, Hyder Ali, in 1765, having laid it waste to chastise European cupidity. Since then it has made considerable progress, and in 1891 had 66,100 inhabitants, which increased to 75,500 in 1901. From Calicut, *calico* derived its name, although the manufacture of that article has now declined. It has an important export trade in timber and spices.

CAL'IDA'RIUM (Lat., hot bath). See BATH.

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AREA AND POPULATION OF CALIFORNIA BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Alameda	C 3	Oakland	764	93,864	130,197
Alpine	D 2	Markleeville	710	667	509
Amador	C 2	Jackson	632	10,320	11,116
Butte	C 2	Oroville	1,660	17,939	17,117
Calaveras	C 2	San Andreas	1,080	8,882	11,200
Colusa	B 2	Colusa	1,088	14,640	7,364
Contra Costa	B 3	Martinez	728	13,515	18,046
Del Norte	B 1	Crescent City	992	2,592	2,408
Eldorado	C 2	Placerville	1,796	9,232	8,996
Fresno	C 3	Fresno	6,152	32,026	37,862
Glenn	B 2	Willow	1,270	.....	5,150
Humboldt	B 1	Eureka	3,496	23,469	27,104
Inyo	E 3	Independence	10,294	3,544	4,377
Kern	D 4	Bakersfield	8,050	9,808	16,480
Kings	D 3	Hanford	984	.....	9,871
Lake	B 2	Lakeport	1,328	7,101	6,017
Lassen	C 1	Susanville	4,520	4,239	4,511
Dos Angeles	D 4	Los Angeles	4,202	101,454	170,298
Madera	D 3	Madera	2,062	.....	6,364
Marin	B 2	San Rafael	549	13,072	15,702
Mariposa	C 3	Mariposa	1,510	3,787	4,720
Mendocino	B 2	Ukiah	3,626	17,612	20,465
Merced	C 3	Merced	1,932	8,085	9,215
Modoc	C 1	Alturas	3,741	4,986	5,076
Mono	D 3	Bridgeport	3,020	2,002	2,167
Monterey	C 3	Salinas	3,340	18,637	19,380
Napa	B 2	Napa	780	16,411	16,451
Nevada	C 2	Nevada City	972	17,369	17,789
Orange	D 5	Santo Ana	750	13,589	19,696
Placer	C 2	Auburn	1,365	15,101	15,786
Plumas	C 1	Quincy	2,694	4,933	4,657
Riverside	E 5	Riverside	7,323	.....	17,597
Sacramento	B 2	Sacramento	1,000	40,339	45,915
San Benito	C 3	Hollister	1,388	6,412	6,633
San Bernadino	E 4	San Bernadino	19,947	25,497	27,929
San Diego	F 5	San Diego	8,478	34,987	35,090
San Francisco	B 3	San Francisco	47	298,997	342,782
San Joaquin	C 3	Stockton	1,396	28,629	35,452
San Luis Obispo	C 4	San Luis Obispo	3,310	16,072	16,637
San Mateo	B 3	Redwood City	434	10,087	12,094
Santa Barbara	C 4	Santa Barbara	2,632	15,754	18,934
Santa Clara	C 3	San Jose	1,286	48,005	60,216
Santa Cruz	B 3	Santa Cruz	424	19,270	21,512
Shasta	B 1	Redding	3,876	12,133	17,318
Sierra	C 1	Downleville	960	5,051	4,017
Siskiyou	B 1	Yreka	5,991	12,163	16,962
Solano	C 2	Fairfield	900	20,946	24,143
Sonoma	B 2	Santa Rosa	1,620	32,721	38,480
Stanislaus	C 3	Modesto	1,456	10,040	9,550
Sutter	C 2	Yuba City	622	5,469	5,886
Tehama	B 1	Redbluff	3,008	9,916	10,996
Trinity	B 1	Weaverville	3,282	3,719	4,383
Tulare	D 3	Visalia	4,952	24,574	18,375
Tuolumne	C 2	Sonora	2,208	6,082	11,166
Ventura	D 4	Ventura	1,721	10,071	14,367
Yolo	C 2	Woodland	996	12,684	13,618
Yuba	C 2	Marysville	636	9,636	8,620

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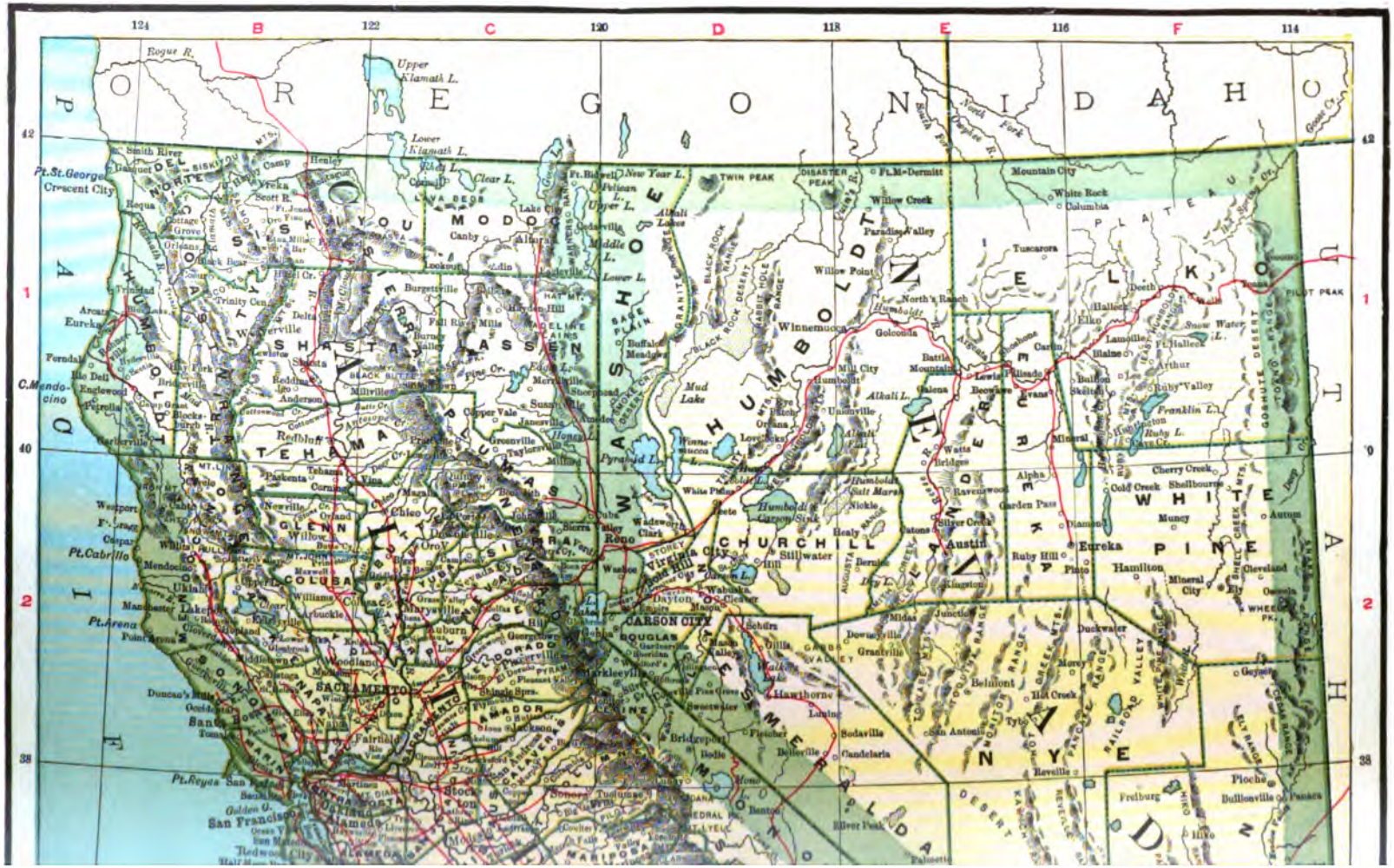
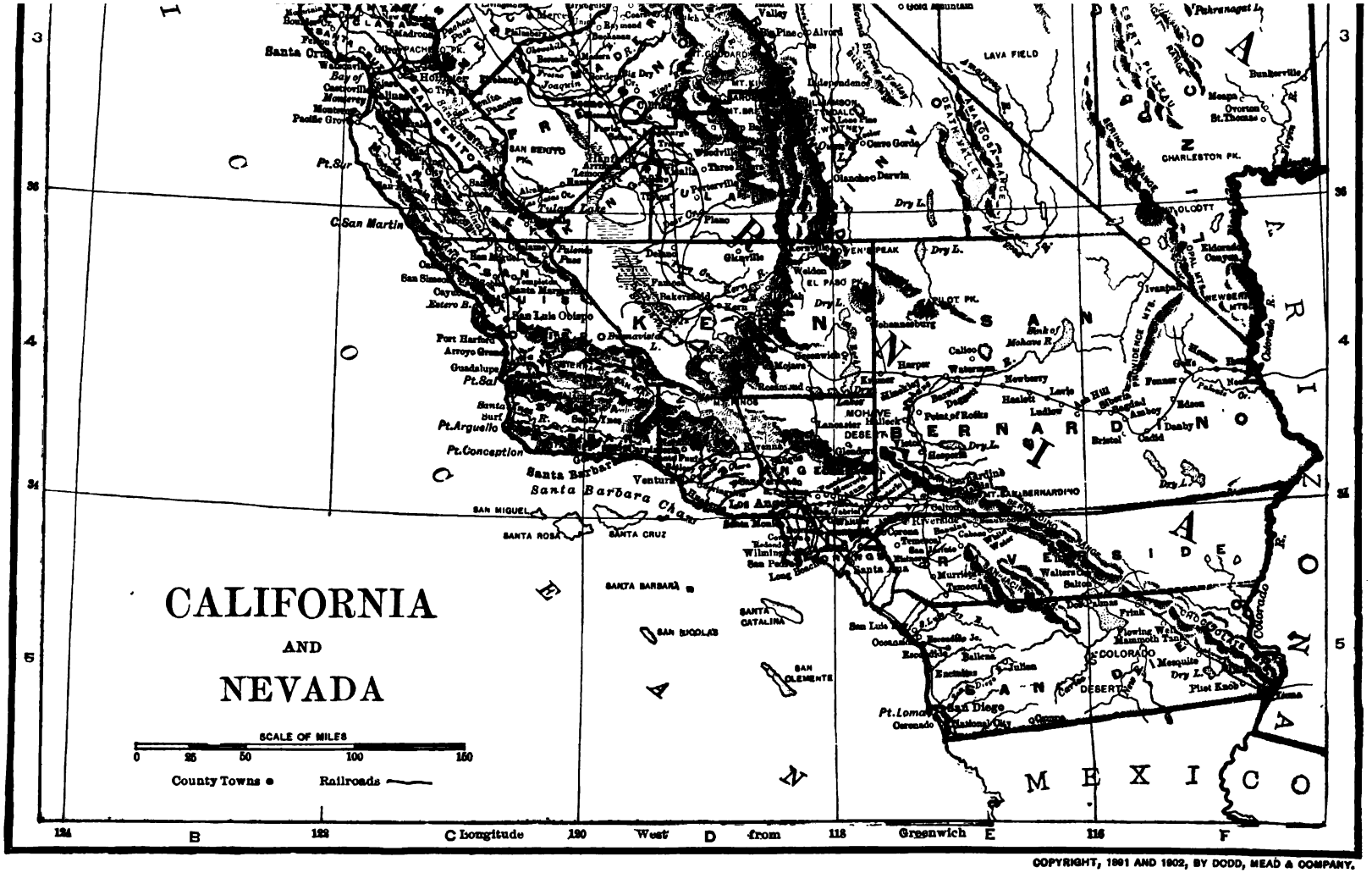

OREGON
IDAHO
CALIFORNIA
NEVADA
UTAH
ARIZONA
Pt. St. George
Crescent City
C. Mendocino
Pt. Cabrillo
Pt. Arena
Pt. Reyes
Golden G.
San Francisco
Eureka
Redding
Sacramento
Stockton
Oakland
Reno
Carson City
Virginia City
Winnemucca
Elko
Ely
Tonopah
Goldfield
Austin
Eureka
Pioche
Lake Tahoe
Pyramid L.
Humboldt L.
Upper Klamath L.
Lower Klamath L.
Mt. Shasta
Mt. Lassen
Mt. Diablo
Mt. Rose
Mt. Grant
Mt. Jefferson
Mt. Wilson
Mt. Ophir
Mt. Pilot Peak
Mt. Moriah
Mt. Wheeler
Mt. Ely
Mt. Pleasant
Mt. Hamilton
Mt. Cleveland
Mt. Gorgonio
Mt. Pinos
Mt. Tamalpais
Mt. Diablo
Mt. Shasta
Mt. Lassen



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CALID'IUS, MARCUS (? -B.C.47). A Roman orator and a contemporary of Cicero, whose recall from exile he advocated. He was prætor in B.C. 57 and after B.C. 49 was made Governor of Cisalpine Gaul, where he died. His oratory is praised by Cicero (*Brutus*, 75-80). For the fragments of his orations, consult Meyer, *Fragmenta Oratorum Romanorum*, 2d ed. (Zurich, 1842); also Quintilian (X. 1 and XII. 10).

CAL'IDORE. A knight representing courtesy in Spenser's *Faerie Queene*. He stands in the allegory for Sir Philip Sidney.

CALIF DE BAGDAD, kà'lêf' de bâg'dâd', LE. See BOIELDIEU, A. F.

CAL'IFOR'NIA (a name applied in Spanish romance as early as 1520 to a fabulous island near the Indies, and "very near the Terrestrial Paradise"). A State on the Pacific Coast of the United States of America, ranking second in area (not reckoning the Territory of Alaska), twenty-first in population, and eighteenth in order of admission, and popularly known as the "Golden State," or in the West simply as the Coast (Map: United States, Western Part, B 3). The State is bounded on the north by Oregon, on the east by Nevada and a small portion of Arizona, on the south by Lower California (Mexico), and on the west by the Pacific Ocean. It stretches along the coast from latitude 32° 40′ N. to latitude 42°, a distance, measured along the centre of the State, of 750 miles, and its eastern boundary conforms to the curve of the seacoast, so that its breadth is approximately the same throughout, averaging about 200 miles. The meridian of 120° W. longitude marks the eastern boundary of the northern third of the State, and bisects the eastward-trending southern part, dividing the whole into two nearly equal parts. The total land area is 155,980 square miles.

TOPOGRAPHY. The physiography of this immense State is strikingly varied, but, broadly stated, consists of two parallel mountain systems, extending northwest and southeast, inclosing between them a very extensive valley, in addition to which is included in the northeast a part of the Great Basin, and in the southeast a part of the Colorado Plateau. Of the two mountain systems, the longer is that known collectively as the Coast Range, being a part of the uplift which defines the continental west coast from the extremity of Lower California to the edge of Oregon, and which reappears in the Olympic range of Washington and the islands of British Columbia, and southern Alaska. Within the limits of California, beginning at the south, it is made up of the San Jacinto, Santa Ana, San Bernardino, and San Gabriel ranges, then of the San Rafael and Santa Lucia mountains along the lofty coast between Los Angeles and Santa Cruz. Interior to these is a second lesser range, called by the Mexican settlers Sierra Madre, which becomes more prominent northward, is broken by the Bay of San Francisco and outlet-valley of the Sacramento River, and extends thence to the border of Oregon, where the watershed bends eastward and forms the very lofty Shasta and Salmon River ranges; but Shasta belongs orographically to the Cascade system of Oregon. Notable altitudes in this system are as follows: San Bernardino Mountain, 11,600 feet; San Jacinto Mountain, 10,987 feet; San Gabriel Peak, 6152 feet; Tehachapi Peak, 9214 feet; Mount Pinos, 9214 feet; Mount Diablo, 2849 feet; Thunder Mountain, 9125 feet; Eddy Mountain, 9161 feet; Scott Mountain, 7850 feet; China Mountain, 8000 feet; Siskiyou Peak, 7662 feet. The altitude of Mount Shasta, a volcanic mass, is 14,380 feet, and its group contains several other peaks approaching 10,000 feet in height.

East of the Coast Ranges, and parallel with them, lies the Sierra Nevada ('Snowy Range'), at a distance of 100 to 140 miles, stretching from the 36th parallel northwestward nearly to the 41st, where it ends at the valley of Pitt River, which separates it from the Shasta Range. This system, one of the grandest on the continent, consists of a massive uplift of ancient stratified rocks, which have been worn into an area of clustered peaks, averaging 50 miles wide and over 400 miles long. The eastern side is abrupt and rises from the plateau of Nevada, but the western slope, receiving nearly all the rainfall and delivering all the drainage, has been worn into a series of tremendous cañons, of which those of the Merced (Yosemite), Kings, Tuolumne, and American rivers are far-famed. The Sierra Nevada is characterized by its extreme ruggedness, the sharp, precipitous, deeply sculptured profile of its peaks and gorges, and by the great average altitude of its central mass, as well as by the prevalence of many peaks, which not only reach into the zone of perpetual snow, but bear remnants of the vast glaciers which, until comparatively recent times, covered the crests of the whole range and took so large a part in its erosion. The principal peaks and their measurements, from south to north, are as follows, beginning with the highest mountain in the United States proper: Mount Whitney, 14,898 feet; Kaweah Peak, 14,000 feet; Mount Brewer, 13,886 feet; Mount Lyell, 13,042 feet; Merced Peak, 11,413 feet; Gray Peak, 11,174 feet; Dunderberg, 13,320 feet; Twin Peak, 8924 feet; Matterhorn, 12,175 feet; Tower Peak, 11,704 feet; Leavitt's Peak, 11,553 feet; Sonora Mountain, 11,478 feet; Stanislaus Peak, 11,209 feet; Pyramid Peak, 10,052 feet. The fact that the southern end of the range is loftier than the northern may indicate the greater work of erosion at the north, due to the greater rainfall there. From Sierra County there runs straight northward along the Nevada boundary a line of elevations of igneous origin, called the Warner Range, containing many high peaks. West of this line of peaks a plateau formed by a lava overflow and averaging 5000 feet above the sea, stretches to the Shasta and Siskiyou mountains and northward into the Klamath region of Oregon.

Between these two mountain systems, the Coast ranges and the Sierra Nevada, lies the great valley of California, broadly open for some 400 miles from where the Kern River Mountains connect the Sierra Nevada with the Coast Range at Tehachapi, to where Shasta closes it in the far north. This valley is divisible into three parts. The first is the basin of the Sacramento River, north of San Fransico Bay, into which the river empties. This stream begins as the Pitt River, which flows out of Goose Lake, in the northern part of the State, forces its way through the gorges that separate the Sierra Nevada from the Shasta Range, and after receiving the McCloud from Mount Shasta, turns southward as the Sacramento River. It is fed by many streams

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from the mountains on each side, of which the Indian, Feather, and American are largest, and in its lower course traverses a marshy flood-plain, annually overflowed. South of where the river turns into the sea and expands into Suisun and San Pablo bays, the valley is occupied by another large river, the San Joaquin, which gathers the waters from all the southern mountains, through its own sources in the heights of Fresno County, and by means of the Merced, the La Grange, Stanislaus, Calaveras, Consumnes and many lesser streams, which periodically pour floods down the valley to flood many square miles of reedy marshes, among which the San Joaquin joins the Sacramento. South of the head of the San Joaquin Valley, and separated from it at Fresno by a low divide, begins a somewhat circular, dry, and fairly level plain, about 100 miles long by 80 broad, the western part of which is a low, alkaline desert, surrounding Tulare Lake—an expanse of marsh-girt waters, 25 miles broad. Into this basin pours Kings River, and toward it flow many other mountain streams, which mostly disappear in the sand. In the southern part of this valley-plain the Kern River flows southwestward through a region some 500 feet above sea-level, and empties into Buena Vista Lake. South and east of the mountains the country becomes a hot and waterless waste, named Mohave and Colorado deserts, sloping gradually to the Rio Colorado and the Gulf of California. In the northern half this waste is broken by ranges and groups of arid, volcanic hills, among which lie deep salt-covered valleys, the most forbidding of which is Death Valley (q.v.), an alkaline, lava-strewn depression near the Nevada boundary and just north of the 36th parallel. The valley is from 200 to 350 feet below sea-level. On the seaward side of the Sierra Madre, however, is an extensive region, narrowing northward to Santa Barbara, comprising the most populous and useful part of Southern California—the districts about San Diego, Los Angeles, Riverside, Ventura, and Santa Barbara. Similar coast districts are repeated northward in Monterey and Santa Clara counties, and north of San Francisco Bay, in Sonoma and Mendocino counties, west of the Coast Range. Some important rivers descend to the sea in these coastal spaces, such as Russian River, in Sonoma County; Eel River, in Mendocino and Humboldt counties; and Trinity River, in Trinity County, all of which have a northwest course. Flowing irregularly southwest across the northwest corner of the State, is the Klamath River, which drains the Siskiyou, Salmon, and other coast ranges of that region.

The coast south of Santa Barbara is low and sandy, with several large islands in the offing. But north of Santa Barbara it is high and rocky, bold cliffs facing the sea, almost unbroken by harbors, other than that of the Bay of San Francisco, entered through the rift in the coast, cut by the joint outflowing of the Sacramento and San Joaquin rivers, and called the Golden Gate.

CLIMATE. No State of the United States, indeed, few of the most favored countries of the world, can boast of so delightful a climate as that of the valley lands of California. Two seasons, the wet and the dry, divide the year; the first so called because it is the only period during which it rains, though rains are not continuous, and the average fall for the State, twenty-three inches, is less than at Chicago or Saint Louis. This season lasts from about the middle of November till April or May.

At San Francisco snow is almost unknown, the mercury never remains below the freezing point for twenty-four hours, and flowers bloom in the gardens at Christmas time. The average mean temperature at San Francisco is 51°—summer, 60°; winter, 49°. Trade winds from the southwest prevail along the coast and give the valleys opening toward San Francisco Bay a climate peculiarly their own. Owing to the cool summer climate of the coast between parallels 35 and 40, San Francisco in July is cooler than San Diego by 7°, and than New York by 17°, and does not attain its highest temperature until the trade winds cease in September.

In the central valleys greater extremes of temperature are experienced than along the coast. The mean temperature for this belt is 64°, and is remarkably uniform. In the north the summer is warmer and the winter cooler than in the south. The rainfall decreases gradually from north to south, being 51 inches at Cape Mendocino and 46.6 inches at Redding, in the interior, on the same parallel as Cape Mendocino, 23 inches at San Francisco and 4 inches at Bakersfield. In southern California, the climate may be said to reach perfection. At San Diego, the mean winter temperature is 54°, summer, 68°, and at Santa Barbara, 53° and 68° respectively. At Monterey, the difference between the average temperature of January and July, is 6°; at Los Angeles, 12°. San Diego is 6° or 7° cooler than Charleston or Vicksburg, which are nearly in the same latitude. The great heat of the interior and of the southwest, where, as at Fort Yuma, the average summer temperature is 92°, is due to the dryness, which is easily borne, and sunstrokes never occur. Thunderstorms are common in California. Everywhere the nights are cool, or at least endurable; the clearness of the atmosphere causing rapid radiation. Early spring, comprising the latter part of February and the month of March, is the most delightful part of the year. The air is mild, the sky clear, and the landscape gay with flowers. Summers are dry except along the coast from six to ten miles inland, where fogs are likely to occur. During the summer the earth becomes dried to a depth of several inches; the air is filled with dust, the vegetation is burned brown, and the smaller streams disappear, a state of things that lasts until the autumn rains begin. Among prominent winter resorts are San Diego, noted for its fine harbor, on one side of which is the famous Coronado Beach; Santa Barbara, overlooking the Pacific, a favorite watering-place; Santa Monica, noted for surf-bathing throughout the year; Santa Cruz, with a fine beach and background of mountains; Monterey, on beautiful Monterey Bay, associated with the earlier history of the province under Spanish rule; Indio, over 100 feet below sea-level, is remarkable for cures effected by its air in pulmonary diseases; Los Angeles and adjoining places, including Pasadena, in a section that has been termed 'the Italy' of the United States—a paradise of rose-gardens, vineyards, and lemon and orange groves. Other resorts are the Arrowhead Hot Springs, El Paso de Roble, and Napa Soda Springs.

FLORA. As California presents almost every variation of climate known on earth, ranging from that of the tropics to that of the Arctic

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CALIFORNIA FLORA

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1 GILIA - GILIA TRICOLOR
2 WESTERN DOG'S TOOTH VIOLET - ERYTHRONIUM GRANDIFLORUM
3 CALOCHORTUS WEEDII
4 BUTTERFLY TULIP - CALOCHORTUS VENUSTUS
5 CALIFORNIA POPPY - ESCHSCHOLTZIA CALIFORNICA
6 CALIFORNIA LILY - LILIUM PARDALINUM

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regions on its high mountains, and from a copious rainfall to the aridity of the desert, it naturally presents a very wide variation in its flora. The influence of climate upon flora is nowhere more strongly marked than in this State. The tree flora of California, as of the entire western part of the country, is characterized by consisting almost entirely of coniferæ, while broad-leafed trees are very few in number, consisting of oaks, madroña, and a few other species very limited in number and distribution. The trees of all species are of great size. For illustration, see SEQUOIA.

Stretching along the Coast ranges from the Oregon line southward nearly to the Bay of San Francisco, and in scattered groves even as far as Santa Cruz, is found the redwood, whose enormous trees form an extremely dense forest, extending to the lower part of Mendocino County. This forest occupies the foggy, wet stretch of land closely bordering the coast. East of this, in the northern Coast ranges, is a mixed forest consisting of red fir and yellow and sugar pines. The coast ranges south of these forests are almost treeless, but are covered with grasses, and often with a variety of thorny bushes, catsclaw, manzanita, scrub oak, etc., which collectively are known as chaparral. Here and there among them are scattered oaks and digger pines. The ranges of southern California, which rise to greater altitudes, are, on their lower slopes, covered with chaparral, while above 5000 feet are open forests of yellow pine, with scattered specimens of sugar and Coulter pine among them. The valleys of southern California contain some chaparral, with a little grass and many cacti and Spanish bayonet, being the vegetation which is peculiar to an arid region.

The great valley of California is, in its northern part, covered with a scattering growth of oaks, while the southern part is devoid of timber of any sort, and is more or less under cultivation. The marshes on the lower courses of the Sacramento are covered with tule reeds. The Sierra Nevada is, on its lower slopes, covered with a thick growth of chaparral, with a few oaks and digger pines, while above an altitude ranging from 3000 feet in the southern part to 1500 feet in the north begins the yellow-pine belt, which is composed mainly of trees of that species, with sugar-pine, incense-cedar, and red fir intermingled. This occupies a strip on the west slope of the range, extending up to an altitude of 8000 or 9000 feet, above which it is succeeded to the timber-line, which ranges from 9000 to 10,000 feet, by trees of more Arctic character—firs, hemlock, and, finally, at the timber-line, by white-barked pine. On the east side of the range the succession is somewhat similar, but the belts are much narrower, owing to the abruptness of the range on this side. The plateau east of the range is a desert, with very little vegetation, and that of low shrubby growth. In the yellow-pine belt, upon the west slope of the Sierra, there occur ten groves of Sequoia Gigantea, the largest and oldest tree on earth, ranging in size up to 33 or 34 feet in diameter, with heights of from 300 to 350 feet. These do not occur in pure growth, but scattered among the yellow pines. Most of the groves are within national forest reserves or national parks, but much of the land, unfortunately, is held in private hands, and the trees are being cut for lumber.

FAUNA. As California extends north and south through nine degrees of latitude, and ranges from arid deserts in the south to humid and forested mountains in the north, and from the lofty Sierras on the east to the sea, it must not only embrace a large variety of animal life, but include several distinct faunas adapted to its varied climates and terrenes, such as those of the coastal valleys and plains; of successive zones of altitude in the mountains; of the sandy southern semi-tropical deserts, etc. Few of its animals are of the same species as those found in the eastern half of the United States. The representatives are all of distinct surface races; but California is closely allied, zoölogically, to the interior basin and Rocky Mountain region. Among the characteristic mammals of the State are the grizzly and black bears; wolves, large and small, and several fur-bearers; puma and lynx; varieties of the white-tailed and black-tailed deer, and in the extreme north the Columbian blacktail. The bison never entered the State; the wapiti did so formerly, but is no longer to be found there. The bighorn wanders in the high Sierra, where also are found the peculiar little beaver-like sewellel, and various picas. Several rodents, such as the golden and Douglas squirrels, are peculiar to these parts of the mountains, while the plains abound in burrowing rodents, among which are large hares that have increased since civilization reduced their enemies, until in the central and southerly parts of the State they have become a decided pest. The coast fauna comprises several representatives of the seal family. The birds of California include many species not known elsewhere. A species of vulture, the California condor, was the most remarkable, but is now extinct in Lower California. The two-crested quails of the State are familiar to sportsmen, as also is the large local ground-cuckoo, called road-runner. Another remarkable local bird is the California woodpecker, peculiar in storing great quantities of acorns in holes in the bark of trees for winter consumption. The islands off the coast, especially the Farallones, are well supplied with sea-birds. Among reptiles, two or three species of rattlesnakes are exceedingly numerous in the lower parts of the mountains, and all over the southern region, where also a great variety of lizards exists. The fishes of both the sea and fresh waters are numerous and valuable. Peculiar classes of sea-fish are the rose-fish, smelts, surf-fish, herrings, rock-trout, and various important food-fishes of the cod family. The rivers of the north receive annually vast 'runs' of salmon, which are different from the Eastern salmon (see SALMON). Few of these fishes are the same as Atlantic species, but many belong to groups well represented elsewhere. The care and protection of game animals and fish-culture have received much attention.

GEOLOGY. A large part of the area is underlain by sedimentary strata of a comparatively recent geological age. Triassic and Jurassic beds predominate in the northern and west-central parts, and Cretaceous and Tertiary beds in the coastal region. Along the Sierra Nevada and Coast ranges volcanic rocks are strongly developed and cover wide areas. The central axes of these two great ranges are formed, however, by ancient igneous and metamorphic rocks which may belong to the Archæan formation. Granite is especially

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prominent in these localities and constitutes some of the highest peaks. The elevation of the Coast Range took place at the close of the Miocene period, while the Sierras were formed largely by an uplift that occurred near the end of the Jurassic period. Carboniferous strata occupy a large area in the central part of the State, but they inclose no coal-seams of economic importance.

MINING. California is rich in mineral deposits, particularly gold, which is found in over thirty counties, and the rapid settlement and development of the State were due to this fact. Gold was obtained by washing as early as 1841, near San Fernando mission; but it was the discovery at Sutter's Mill, near Coloma, in 1848, that made evident the abundance of the metal and attracted the excited throngs of adventurers. Many of these engaged in river mining—i.e. washing in sheet-iron pans or wooden 'rockers' the gold from the sands or gravels from or near river channels; others dug the gold 'dry' from veins in the rocks. About 1851 sluices were introduced, by means of which the gravels or sands were run over the bottom of a wooden box provided with blocks of wood or round stones to catch the gold as it sank. Digging soon extended from the rivers and the gulches to the higher ground, where the difficulty of washing was increased; but in 1852 the hydraulic system was brought in. In this, continuous powerful streams of water are directed through nozzles upon a gold-bearing bank or deposit. This was so successful that whole hills were reduced and swept away, but this practice was soon forbidden by law, as the detritus threatened to choke the rivers and seriously damage the agricultural interests in the valleys below. Nearly all the mines are on the western slope and in the foothills of the Sierra Nevada in a belt of country about 220 miles long by 40 wide, extending into Oregon. The gold is found in a metallic condition, but is usually mixed with silver or other metals. In stream or alluvial deposits ('placers') it occurs as fine scales or coarse grains. In rocks, it is found in quartz veins, and costly machinery must be used to crush the ore, from which the gold is extracted by amalgamation with quicksilver. Where, as often is the case, the gold-bearing gravels underlie volcanic rock several hundred feet thick, drift or tunnel mining combined with sluicing is necessary. The chief gravel-mining region extends from Mariposa County into Plumas County, or between parallels 37° and 41°, and includes some quartz veins. Most of the gold is now obtained from the quartz mines, especially in Calaveras, Kern, Trinity, El Dorado, Nevada, and Sierra counties. Gold-mining is to-day greatly facilitated by the application of electrical power, which the mountain streams are made to generate. The great prominence and significance of gold in the early years of the State are evident from the great size of the output, the annual average for the decade between 1850 and 1859 inclusive being estimated at over $55,000,000, and constituting nearly the entire product of the United States. Following this period there was a constant decline in the output, which reached the minimum ($12,000,000) in 1892; it then revived, and for the last half-decade of the century averaged over $15,000,000 annually. The State continued to hold first place until 1897, when it was surpassed by Colorado. The total output of the State to the end of 1900 was about $1,350,000,000. While rich silver ores are found, there are no mines which produce silver exclusively. The $700,000 of silver mined in 1900, an increase over former years, was a by-product from gold, lead, or copper mining. Copper-mining has recently made rapid progress, and the State ranks fourth in the production of copper ore, the product having increased from 6300 tons in 1897 to 13,200 tons in 1900.

This ore, which is found principally in Shasta County, is partly shipped out of the State for smelting. The State produces almost the whole of the quicksilver output of the United States, its mines rivaling those of Spain in productiveness. From 1875 to 1882 the output averaged 64,000 flasks annually, but since that period the annual average has been only 30,000 flasks; the value of the product ranged from $1,000,000 to $1,500,000. Fifty per cent. of the product is secured from Santa Clara County. The fuel products of the State include petroleum, bituminous coal, and natural gas, of which the first is the most important. The oil is found in the southern coast region, particularly Los Angeles, Kern, Santa Barbara, and Ventura counties. It is refined to some extent, but its most important use is as a fuel. Its production is steadily increasing, the output having grown from 300,000 barrels in 1890 to 4,250,000 barrels in 1900. Bituminous coal is mined in Monte Diablo and the neighboring hills. For several years the output fluctuated around $200,000 in value, but for a few years now the annual output has doubled that amount. Natural gas is found in the Sacramento and San Joaquin valleys. The State ranks second in the production of mineral water, the product for 1899 having been estimated at $698,000. Salt is obtained by the evaporation of sea-water. Building-stone is abundant, and includes hydraulic limestone, rhyolite, bluish and light-brown sandstones from San Francisco Bay, and from San José a light-brown variety, which is almost pure silica, cuts easily, and stands fire well. San Bernardino County yields marbles of many shades; El Dorado County, fine white marble streaked with blue; and in Inyo County some of the foothills are composed of white marble equal to Italian. Freestone, buhrstone, granite, and basalt suitable for pavements and buildings are also found in abundance, while the granite output averaged in value about $1,000,000 annually during the last decade of the century. Brick clays occur in some localities. Asphalt is obtained in varying quantities and constitutes the greater part of the output of the United States, the largest annual product, that for 1898, exceeding $600,000 in value.

FISHERIES. California rivals Oregon in the extent of her salmon fisheries, the annual exports of salmon alone exceeding $2,000,000 in value. The supply of this and other varieties of fish has been increased through the activity of the State Government in enforcing protective laws and establishing hatcheries. The annual exports of shell-fish fall a little under $200,000 in value. The total value of the exports of fish from San Francisco during 1895-97 exceeded $2,500,000. There is a large local consumption of salt fish—flounder, sole, and tomcod—the supply of which is secured by drag-net fishing along the mud banks extending from Point Reyes south to Men-

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CALIFORNIA SHRUBS

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1 CALIFORNIA SHRUBBY MONKEY-FLOWER - MIMULUS GLUTINOSUS
2 CALIFORNIA LILAC - CEANOTHUS THYRSIFLORUS
3 CHAMISO - ADENOSTOMA FASCICULATUM
4 SHRUBBY POPPY - DENDROMECON RIGIDUM
5 MANZANITA - ARCTOSTAPHYLOS MANZANITA
6 CALIFORNIA LAUREL - UMBELLULARIA CALIFORNICA

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terey. The State ranks next to Massachusetts in whale-fishing.

AGRICULTURE. California has no equal among the States, and, indeed, scarcely among the countries of the world, in natural agricultural possibilities. In no other part of the world is so great a variety of crops brought to so high a stage of development. Over the greater portion of the agricultural area the crops of both the temperate and the sub-tropical zones can be grown at will, with equal success. Since 1850 the agricultural section of the population has increased more rapidly than any other. During the decade 1890-1900, the number of owners and tenants increased much more rapidly than did the total rural population, being contrary to the tendency shown in the two decades preceding. This is indicative of the movement now in process by which the large estates under the influence of increased irrigation and intensive cultivation are passing into the hands of smaller landowners. These large estates were partly the result of easy acquisition of land and partly of confirmation by the United States Government of Mexican land grants to private individuals. The holders of these estates were at first opposed to subdividing them, and only recently have settlers been able to obtain desirable farms on them. Still the average size of the farms in 1900—397.4 acres—was quite large, and there were 4753 farms which contained 1000 acres and over, constituting 62.8 per cent. of the total farm acreage. The income per acre from the farms is in inverse ratio to their total area; the farms under three acres in size having an average income of $253.89 per acre, while the farms of 1000 acres and over averaged but $2.02 per acre. The smaller farms are devoted to city dairying, and to floriculture, and to the more valuable and intensively cultivated crops, while the larger are generally unirrigated stock or grain farms.

The earlier agricultural period was characterized by the great predominance of wheat-raising. Many of the large holdings were almost exclusively devoted to this industry, giving rise to the large ranch or bonanza farms of world-wide fame. Thus the production of wheat became enormous, at one time exceeding that of any other State. This was accomplished for the most part without irrigation. The Defiance and the White Australian varieties were grown for milling, and Sonora wheat for shipping, the dryness of the atmosphere resulting in a superior quality of grain which was in special demand in the London markets. The maximum acreage under wheat (2,875,000) was reached in 1893, since when the State has lost in relative importance as a wheat-producing State. The central valley is the great wheat district of the State. Owing to the level formation of the surface and the freedom from any kind of obstruction, the most expensive and complicated farm machinery invented is more extensively used here than anywhere else in the world. The same machine plows the ground, prepares the soil, and sows the seed, and probably two-thirds of the crop is gathered with a combined reaper and thresher. Steam power is largely used. Barley is the only other cereal which is extensively grown, and the only crop which has been rotated with wheat. The conditions are very favorable to its growth, and there is a tendency to substitute it for corn as a stock-food. About 1,000,000 acres are devoted to its cultivation—or nearly one-third of the total acreage under that crop in the United States. Both wheat and barley are extensively used for hay, being cut down while green. Corn matures later and requires irrigation, and inasmuch as the irrigated land is more profitable when devoted to the more valuable crops, and barley can be substituted for corn, but little of the latter is cultivated. Oats likewise is little grown except for use as hay. The total, in 1900, for all grains cut green for use as forage was 1,506,000 acres, or considerably more than twice the amount of all other hay and forage crops. The acreage for hay and forage crops was 56.4 greater in 1900 than in 1890. The abundance of alfalfa and other food-plants of the bee has encouraged the keeping of bees, and honey is a considerable product.

The native grasses, oats, and clover dry without cutting, but constant pasturage has almost exterminated them, and alfalfa in moist regions, and Texas mesquit grass on dry hills and plains, are taking their place. Alfalfa yields three to four crops a season. The cultivation of hops is rapidly becoming an important industry.

IRRIGATION. The aridity of the climate of California is not so extreme as is generally supposed, nor is it without its advantages. In most parts the rainfall of the spring months is sufficient for the development of the early-maturing crops, while the numerous mountain streams supply a source of irrigation for the production of the more valuable or the later-maturing crops. In nearly every county some farming is done without the aid of irrigation. The irrigated area, however, is being constantly and rapidly extended, and is exceeded only by that in Colorado, although the value per acre of the products of the irrigated land is much greater than that of Colorado or any other State. In 1900 the advantages of irrigation were afforded to 35.4 per cent. of the total number of farms and to 12.1 per cent. of the total improved acreage, or 1,446,000 acres of land. The irrigated farms averaged only 57 acres in area. The average cost, per acre irrigated, of the construction of works for irrigation was $10.30 for the State, but in certain districts, and particularly in the southern counties, the cost is much higher, reaching $42.57 in San Diego County. There are 152,500 acres irrigated from wells and tunnels, but the greater portion receives its supply from streams and other surface sources.

As a result of the growing irrigation facilities, the horticultural products are becoming especially prominent. Many varieties of horticultural plants, difficult or impossible to raise in other States, and for a supply of which the country was formerly dependent upon imports from abroad, are now produced with great success in California. This is especially true of the regions where the rainfall is lightest, and the necessity and consequent advantages of irrigation are greatest—i.e. on the southern Pacific coast and in the valley of the San Joaquin. But more recently the development of fruit-growing in the Sacramento Valley has made irrigation prominent in that region, the application of the system being greatly facilitated by the utilization of abandoned ditches, originally used as water-conduits in connection with hydraulic mining. In the central and northern coast regions the natural rainfall, unaided by irrigation,

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is adequate even for fruit-culture. The cultivation of fruit and the preparation of it for the market now give employment to more people than any other industry. Of the great variety of horticultural plants grown in the State, the most notable are the vine, the citrus fruits, oranges and lemons, and the prune, the latter being more extensively cultivated than any other orchard fruit in the State.

Viticulture was early introduced by the Spaniards, but no specialty was made of it until 1857. At present it receives much attention in almost every agricultural section of the State. The choicest and hardiest European wine-grapes have been imported, and are rapidly replacing the less desirable varieties. The phylloxera has created great havoc, and the only way of overcoming it seems to be by grafting choice varieties of grapes on native wild vines known as *resistant* vines, which the phylloxera will not attack. The production of wine and raisins (see table below) has reached enormous proportions, and the State supplies the whole country with table-grapes of superior qualities. Fresno County is especially famous for its raisin crop.

Oranges were first planted in Los Angeles, and up to about 1872 the production was confined principally to that region. A large part of the long interior valley has since been found to be adapted to citrus-culture, and the citrus belt now extends along the foot-hills from Shasta to San Diego, a distance of over 700 miles. Owing to the dry warmth of the inner valleys and to the longer days in summer, the fruit ripens at Oroville, Newcastle, etc., six weeks earlier than at Riverside or Pasadena. In southern California oranges are gathered fresh from Christmas to July, and lemons and limes all the year. Nine or more varieties of oranges are grown, and from the sweet navel, or seedless orange, a non-alcoholic wine is made.

In the year 1899-1900 over 17,000 cars of citrus fruit were shipped from the State, the value of which exceeded $8,000,000. The production of prunes is greatest in the Middle Coast counties. The State produces about half of the total crop of the United States, and has outstripped even France. The production of apples, peaches, pears, and cherries is also enormous, but the output for each of these is at least equaled by other States. Berries grow luxuriantly, and in the southern part of the State strawberries are gathered almost throughout the year. The success attending the production of apricots, almonds, olives, figs, and walnuts is of especial interest, inasmuch as the experimental stage has now been passed, and they have come to occupy an accepted place among the staple products of the State. Almonds are grown principally in the central part of the State; olives and walnuts in the southern part; while figs and apricots have a more general distribution. A large number of other tropical or semi-tropical fruits and nuts are now being successfully introduced. Vegetables are raised in great abundance, being shipped abroad. The conditions are especially favorable for the sugar-beet, the State ranking with Michigan in the production of that plant. The following table shows the development of the fruit industry for the last decade:

GENERAL SUMMARY AND COMPARATIVE TABLE OF SHIPMENTS BY RAIL AND BY SEA, OF FRUITS, WINE, BRANDY, AND VEGETABLES. (TONS OF 2,000 POUNDS.)

KINDS	1890	1892	1894	1896	1898	1900
Green Deciduous	34,042.0	59,374.5	90,692.2	57,638.3	69,732.2	91,176.0
Citrus Fruits	34,209.6	34,857.5	58,964.0	99,156.0	180,658.9	226,500.0
Dried Fruits	32,297.5	29,762.2	51,828.2	48,522.8	76,662.7	90,000.0
Raisins	20,560.1	26,673.4	46,954.4	34,434.6	47,796.3	36,000.0
Nuts	787.1	2,061.9	3,953.5	4,972.6	5,815.8	*
Canned Fruits	40,060.9	55,273.7	60,352.6	45,546.9	52,219.7	75,500.0
Total Fruit by rail and sea, carloads	16,195.7	20,800.3	31,274.4	29,026.7	43,288.6	*
Carloads Wine and Brandy by rail and sea	*	4,832.5	7,663.5	7,609.0	9,014.0	*
Total Fruit, Vegetables, Wine and Brandy by rail and sea, carloads	16,195.7	25,632.8	43,624.7	38,254.0	56,149.6	*

* Not reported.

Thus it will be seen that the horticultural development in California has been rapid and continuous. For certain products, however, further immediate extension seems improbable, as the supply now equals the demand. Such products as can find a foreign market may and do continue to develop.

STOCK-RAISING. The equable climate greatly favors stock-raising. By shifting the stock from the foothills in the summer to the valleys in the winter, pasturage is afforded for the greater part of the year. The increased production of alfalfa has greatly advanced stock-raising. The State was formerly one of the foremost sheep and wool producers, but for twenty-five years the number of sheep has constantly decreased, and at the close of the Nineteenth Century was less than one-half its former size, being about 2,000,000. Large numbers of cattle are shipped into the State from Arizona to be fattened for market. Dairying has but little developed. The general breed of horses is not of a high grade, but there are a number of large horse-raising farms which are noted for their superior breeds, and their trotters, especially, are in great demand in the eastern markets. Ostrich farming is limited to a few ranches.

MANUFACTURES. California has been subject to a variety of conditions, the effect of which has been to guarantee a steady development of the manufacturing industry, but within very definitely restricted limits. The State's comparative isolation and remoteness from other centres of population, and the heavy freight charges necessarily incurred in transportation to and from the State, have given a field free from competition. At the same time, these very conditions have denied entrance into the more extensive market of the world, except with those manufactures for the production of which the State's superior resources give a decided advantage. California is further held back by the high

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price of labor, and the scarcity and consequently high price of fuel. Moreover, the superior advantages offered in mining and agriculture have tended to divert capital from manufacturing. Nevertheless, the value of manufactured products has reached a high figure, being exceeded in but few States. The exceptional resources of field and forest account chiefly for this; but the relation of the State to Hawaii has given rise to a large sugar-refining industry, while mining has created a demand for quantities of machinery and explosive materials.

The total value of manufactured products increased from $66,000,000 in 1870 to $213,000,000 in 1890 and $302,000,000 in 1900. In the latter year there were over 71,000 men, 17,000 women, and 2000 children under 16 years of age employed in manufacturing, constituting in all 6.1 per cent. of the population. Of the fourteen leading branches of manufacture, five were dependent upon agriculture or horiculture. As a wheat-growing State, California early became an important flour-producer, shipping considerable quantities to China and other foreign countries; but with the change of interest from wheat to fruit, the production of flour has slightly decreased, as will be seen from the table appended. The canning and preserving of fruit has now become of equal importance, having almost doubled its value during the decade, and placing California first among the fruit-producing States. In the above, some vegetables are also included, such as tomatoes and peas. The manufacture of liquors, also dependent upon agriculture, is developing at an almost equally rapid rate. The high grade of grapes grown has given rise to the manufacture of wines, whose output now exceeds the total of all the other States, being estimated at $3,900,000. But the malt liquors are as yet of greater value, being estimated at over $5,000,000, the large supply of grain and hops giving a special advantage to this industry. Slaughtering is another thriving industry, especially the branch of it which is concerned with meat-packing, this having increased in value from $2,400,000 to $8,200,000. The production of factory butter, etc., although having practically begun during the decade, has already become important. The State ranks second in the production of beet-sugar, the product for 1900 being valued at $3,500,000. Besides this, San Francisco, being the nearest port

COMPARATIVE SUMMARY OF FOURTEEN LEADING INDUSTRIES

INDUSTRIES	Year	Number of establishments	Average number of wage-earners	Value of products, including custom work and repairing
Total for selected industries for State	1900	2,184	37,068	$131,246,019
	1890	1,540	27,536	102,373,233
Increase, 1890 to 1900	.....	644	9,532	28,872,786
Per cent. of increase	.....	41.8	34.6	28.2
Per cent. of total of all industries in State	1900	17.4	40.7	43.3
	1890	19.4	37.9	48.0
Cars and general shop construction and repairs by steam railroad companies	1900	29	4,920	7,553,626
	1890	10	2,858	4,923,071
Lumber and timber products	1900	313	5,806	13,764,647
	1890	258	4,689	8,794,655
Lumber, planing-mill products, including sash, doors and blinds	1900	136	2,022	4,807,690
	1890	120	2,127	4,941,466
Printing and publishing, newspapers and periodicals	1900	512	2,683	6,858,192
	1890	376	2,799	6,500,445
Foundry and machine-shop products	1900	250	4,782	12,047,149
	1890	154	3,192	7,767,780
Explosives	1900	7	906	4,283,818
	1890	4	285	2,523,770
Clothing, men's, factory product	1900	96	2,410	3,869,891
	1890	121	1,277	2,568,921
Fruits and vegetables, canning and preserving	1900	136	7,486	13,081,829
	1890	61	5,670	6,211,440
Flouring and grist mill products	1900	124	857	13,100,944
	1890	101	855	14,200,320
Liquors	1900	294	1,496	9,261,600
	1890	201	1,477	5,596,800
Cheese, butter, and condensed milk, factory product	1900	178	402	3,582,942
	1890	19	49	172,579
Slaughtering	1900	58	925	15,717,712
	1890	50	436	9,768,858
Sugar and molasses, refining	1900	6	919	15,909,998
	1890	3	723	22,673,850
Leather, tanned, curried, and finished	1900	45	1,454	7,405,981
	1890	62	1,099	5,729,278

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of entry, secures raw sugar from Hawaii for refining. The total value of the amount refined in 1900 was estimated at $15,900,000. Hides were formerly exported, but are now manufactured into leather within the State, and this industry has grown until the local supply of hides no longer equals the demand. The manufacturing interests originally developed in response to the demands of local mining concerns are now beginning to enter other markets. Shipbuilding is also developing. The United States battle-ship *Oregon* was constructed by a California establishment. Over two-fifths of the total product of manufactures was accredited to San Francisco; but the city had no gain during the decade. Los Angeles was the only large city that enjoyed any considerable increase, the product of that city more than doubling in value. This was partially due to the recent discovery of petroleum there, and the use of it as fuel. The foregoing table is a summary for the fourteen most important manufacturing industries in the State.

LUMBERING. California, like the other Pacific Coast States, has a remarkable wealth of forest resources: but remoteness from the market and the difficulties of transportation have delayed their exploitation. From the above table it will be seen, however, that lumbering is enjoying a steady growth. The industry centres in the Humboldt Bay region, on the Pacific Coast, but also extends along the western slope of the Sierras as far south as Fresno County. From the immense redwoods of the Pacific Slope, large quantities of lumber and shingles are manufactured, while the equally large firs are used for the building of houses and ships. Among other valuable varieties are the cedar, adaptable for finishing work and furniture; the chestnut oak, used for tanning; and the yellow pine, valuable for lumber and for the production of resin and turpentine. The deciduous trees are not great in variety, nor of much industrial value.

TRANSPORTATION AND COMMERCE. The long coast line has few excellent harbors, and the inland navigation is not extensive, being confined principally to the Sacramento River, which is navigable for small vessels as far as Red Bluff, and the Colorado, which is navigable through its entire course along the borders of the State.

Railway facilities are well developed, particularly in the great central valley. Only in the northeastern portion of the State is commercial progress seriously retarded by a lack of transportation accommodations. Two important transcontinental lines—the Southern Pacific and the Santa Fé Pacific—enter the State from the south, while a third transcontinental line—the Central Pacific—enters it a little north of the centre, San Francisco being the terminal point of all. On the Central Pacific are 33 miles of wooden galleries, known as 'snow-sheds,' and costing from $40,000 to $1,100,000 per mile, according to the amount of masonry needed. The San Francisco and Northern Pacific makes connection with the railway systems to the north. In 1860 the State had 23 miles of railroad, which had increased in 1880 to 2195 miles, in 1890 to 4349 miles, and in 1900 to 5750 miles. There are 0.27 mile of line per 100 square miles of land territory, and 38.72 miles per 10,000 inhabitants.

Commerce centres mainly at San Francisco, over two-thirds of all the merchandise imported to the Pacific Coast entering, and considerably over half the exports leaving, by that port. The great lumber trade of the Pacific Coast finds its chief market in that city. The other customs districts are Wilmington, San Diego, and Humboldt. There are lines of steamers to Alaska, British Columbia, Oregon, etc., and to New York, Great Britain, Hawaii, China, Japan, Australia, and South America. Its position on the Pacific Ocean gives the State an advantage in the trade with Oriental countries, which is becoming of increasing value, and contains possibilities whose full import can hardly be appreciated at present. The construction of the Isthmian canal will also be greatly to the advantage of the State, especially in its trade with European countries. The cargoes to Europe consist mainly of wheat, canned fish and fruits, honey, borax, and ores; to Asia and the islands of the Pacific, of large quantities of butter and cheese, canned and cured meat and fish; to Mexico and China, of quicksilver. Shipments across the continent include fruits (fresh, canned, and dried), cattle products, and honey. In 1900 the value of imports of merchandise to the California ports aggregated $49,000,000, and the imports of gold and silver $13,000,000, while the exports of merchandise and bullion were $41,000,000 and $9,500,000 respectively.

BANKING. In 1900 there were 39 national banks in operation, with capital aggregating $11,000,000, deposits $13,000,000, and reserve fund $4,132,000. There were 178 State banks, with $26,980,000 capital stock, $85,880,000 deposits, and $20,580,000 surplus. The private banks numbered 19, having $890,000 capital and $1,629,000 deposits. There were also 53 savings banks, with $7,650,000 capital stock, $158,000,000 deposits, and $6,900,000 surplus. The average deposit in savings banks was $730, or over 30 per cent. more than in any other State.

GOVERNMENT. The present Constitution was ratified by popular vote and became operative in 1879. A proposed amendment must have a two-thirds vote of each House, and be approved by a vote of the State electors. A proposition to revise the Constitution must likewise receive a two-thirds vote of the Legislature and the approval of the people, and the text drawn up in the resulting Constitutional Convention must also be submitted to the people for their approval.

Males who have lived one year in the State, ninety days in the county, and thirty days in the voting precinct, and have not been convicted of infamous crimes, embezzlement, or misappropriation of public money, and can read the Constitution or write their own names have the right of suffrage; but Chinese are excluded.

Legislature.—Senators (40) hold office for four years, Assemblymen (80) for two years. The Legislature meets in biennial sessions, on the first Monday of January of even years, and the pay of the members ($8 per day and 10 cents mileage) is limited to sixty days. The Governor may convene extra sessions, but the power to legislate at these is restricted to the specified subject. The House impeaches, while the Senate acts as a court of impeachment.

Executive.—The Governor, Lieutenant-Governor, Secretary of State, Controller, Treasurer, At-

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torney-General, and Surveyor-General are each elected for a term of four years. A two-thirds vote of each House overcomes the Governor's veto. Money appropriation bills may be vetoed in part. In case of a vacancy in the office of Governor, the Lieutenant-Governor takes his place, and in turn is succeeded by the president *pro tempore* of the Senate. The Governor grants reprieves, pardons, and commutations of sentence.

Judicial.—The Supreme Court, the members of which are elected for a term of twelve years, consists of a Chief Justice and six associates, and is divided into two departments, which may sit separately or as one court. Each county has a Superior Court, whose members are elected for a term of six years. Inferior courts are established by the Legislature. No judge of Supreme or Superior Court can receive his salary unless he swears that no case in his court submitted ninety days previous remains unattended to.

Local Government.—There is a uniform system of county governments, and general laws are enacted for the organization of townships. Laws affecting municipal corporations must be general laws, applying to classes of municipalities made upon the basis of population. A city containing a population of more than 3500 may frame a charter for its own government, which, after being approved by the electors of the city, is submitted to the Legislature for its approval or rejection *as a whole.*

Other Constitutional and Statutory Provisions.—No corporation formed under the laws of the State can employ, directly or indirectly, any Chinese or Mongolian, and contracts for coolie labor are void. Appropriations to sectarian schools are prohibited. The legal rate of interest is 7 per cent., but any rate is allowed by contract. Women may enter upon or pursue any lawful business, vocation, or profession, and the property of married women belongs to them alone.

Sacramento is the capital. The State has eight Representatives in the Lower House of the national Congress.

Finances.—The cash receipts of the State for the fiscal year ending June, 1900, amounted to $11,147,000, the cash payments to $9,549,000, and the balance in the treasury to $5,020,000. The State debt on the same date was $2,460,000, of which amount $2,277,000 was held in trust for the State school and university funds.

Penal and Charitable Institutions.—The penal institutions are the prisons at Folsom and San Quentin, the State Reform School at Whittier (which is conducted on the cottage plan, and where farming and various trades are taught), and the Preston School of Industry at Ione City. The charitable institutions include the insane asylums at Napa, Stockton, Agnew, and Ukiah, all of which are under the control of a State Lunacy Commission; the Home for Feeble-minded Children at Glen Ellen; and the Institution for Deaf, Dumb, and Blind at Berkeley. There are also nineteen orphan asylums receiving State aid and inspection.

Militia.—According to the United States official Army Register for 1901, the total strength of the State militia is as follows: General officers, 4; general staff officers, 44; regimental field and staff officers, 33; company officers, 144; rank and file, 3059; aggregate, 3304. The force is organized into one division of three brigades and seven regiments. There were in 1900 378,000 males of militia age, 212,000 of whom were liable for duty.

EDUCATION. California ranks among the progressive States in its educational policy. The educational system is wide in scope and thorough in administration, and the length of the school year (165 days) is exceeded in only one or two States west of the Alleghanies. The State has succeeded better than most States in dealing with the rural school problem, but still suffers from an undue multiplication of small rural districts. The compulsory school law is not generally enforced. Of 361,000 children between the ages of 5 and 17, in 1900, 266,700 were enrolled in the public schools and 23,300 in private schools. The kindergarten grades enrolled 4400; the primary grades, 170,000; the grammar grades, 82,000; and the 120 high schools, 12,100. Of the teachers of primary and grammar grades, 1100 were males and 6000 females. The average of the salaries paid to male teachers is $81 per month, and to females, $65.50, being much higher than the average for the Western States. The average annual expenditure for primary and grammar grades per child of school age is about $17. About one-half of this is provided for by State apportionments, about one-third by county apportionments, and the remainder by city or district taxes and other sources.

There are five normal schools. The State University at Berkeley, an outgrowth of the State College (chartered in 1855), has a liberal endowment. Its schools of law, medicine, etc., are in San Francisco. Lick Observatory (q.v.) is also connected with it. Leland Stanford Junior University, at Palo Alto, is one of the most heavily endowed educational institutions in the world. Both of the foregoing institutions are coeducational, and in rank take their place with the foremost institutions of the country. Other colleges are: The University of Southern California, Los Angeles, with its school of agriculture at Ontario and theological school at San Fernando; the Roman Catholic colleges at San Francisco, Los Angeles, Oakland, and Santa Clara; the Pacific Methodist, at Santa Rosa; California College, at Oakland; Pomona College, at Claremont: and the University of the Pacific at San Francisco. The Cogswell Polytechnic College, at San Francisco, is maintained by the city. There are theological schools at Oakland, San José, and San Rafael; art schools at San Francisco, San Diego, and Sacramento. The California Academy of Sciences, founded in 1853, and endowed by James Lick (q.v.), is at San Francisco.

RELIGION. From an early date the Roman Catholics have been very active in missionary work. Nearly all the Spanish element of the population, and a large part of the Indian population, are members of that Church, making it numerically the strongest religious denomination. The Methodists, Presbyterians, Congregationalists, and Baptists follow, in the order named, and the other leading denominations are represented. Even with the large Catholic element, but 23 per cent. of the population are church communicants.

POPULATION. California is the most populous of the Western States, and ranks twenty-first in population among the States of the Union. The

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following is the population by decades: 1850, 92,600; 1860, 379,900; 1870, 560,200; 1880, 864,700; 1890, 1,208,100; 1900, 1,485,000. (For population by counties, see table on back of the map.) The per cent. of increase for the last decade (22.9) was greater than that for the whole country. Of fifty-seven counties, all but eleven increased in population. About one-fourth of the population of the State is foreign born, the Irish, Germans, and English, in the order named, being most numerous. The State has a Mongolian population about equal to that of the rest of the United States, the Chinese numbering 45,700 and the Japanese 10,150. The former have greatly decreased in numbers, and the latter increased, during the last decade. Fifty-five per cent. of the population are males, the large predominance of this sex among the Mongolians being partly responsible for this result. The Indians number 15,300, and the negroes 11,000. Most of the Indians are taxed, and have made considerable progress in civilized life. The most decided increase during the decade was on the part of the natives born of foreign parents, this class exceeding 21 per cent. of the total population.

There are 9.5 individuals to the square mile, and a decided tendency is manifested to segregate in cities. There are twenty-four places having a population above 4000, their inhabitants constituting 48.9 per cent. of the total population, though in seven States the per cent. is higher. The following are the leading cities: San Francisco, 342,700; Los Angeles, 102,400; Oakland City, 66,900; Sacramento, 29,200; San José, 21,500; San Diego, 17,700; Stockton, 17,500; Alameda, 16,400; Berkeley, 13,200; Fresno, 12,400.

Indians.—The Indians in 1900 numbered 7654, who were located on twenty-six reservations—namely, Hupa Valley, Round Valley, Tule River, Yuma, and twenty-two mission reservations. They are from a large number of tribes, and represent at least fourteen different linguistic stocks. At least one-half of them can speak enough English to carry on ordinary conversation, and the greater number wear citizens' clothing. They are, as a rule, self-supporting, rations being issued only to the old and infirm. In some of the reservations, not only stock-raising, but farming and fruit-growing, have attained a considerable development. The Indians of the Yuma Reservation are the most primitive in the State, living principally upon fish and the mesquit-bean, which abound on the reservation.

History. The name California first appears in a Spanish romance, published in 1510, as that of an island lying somewhere in the western sea near the equator. The term was originally applied to what is now Lower California, which was visited by the Spanish as early as 1533. Later the name was extended to the whole western coast of North America below the parallel of 42°, and the distinction of Upper and Lower California was introduced. The first exploration within the limits of the State was done in 1542 and 1543, when Cabrillo visited the coast and islands of the Santa Barbara region. In 1579 Sir Francis Drake coasted as far as the forty-eighth degree of latitude, and named the country New Albion, but did not, as is generally supposed, enter the Bay of San Francisco. In 1602 and 1603 Vizcaíno explored the bays of San Diego and Monterey, and sailed as far north as Point Reyes. The Spanish attempted to civilize the country by the establishment of missions along the coast. In 1769 the first mission in California proper was erected at San Diego by the Franciscans, and by 1823, when the last and most northerly station had been planted at Sonoma, these religious houses had grown to 21 in number, and acquired great wealth in olive, orange, and grape plantations, and cattle and horse ranches. The Indians were reduced to a state of infantile tutelage. They were treated not unkindly, and were even made acquainted with the rudiments of the Christian religion, but they failed to profit by the Spanish rule, and disease played havoc with their numbers. The Spanish Government, which intended eventually to turn the mission estates into administrative districts, never acknowledged the title of the priests to the land, and in 1777 began the founding of pueblos or towns. Upper California was divided into the four provinces of San Diego, Santa Barbara, Monterey, and San Francisco. After the Mexican Revolution of 1821, the missions began to decline. The Indians were partly emancipated in 1826, and the process of secularization, which began in 1833, was completed by 1845. Commerce with foreign nations, which was at first forbidden, became very large after 1822. In 1826 the first American immigrant wagon train entered California. In 1840 Monterey was made the capital, and a year later the Russians, who had maintained a trading-post north of Bodega Bay since 1812, abandoned it.

Under the Mexican Republic California enjoyed virtual autonomy, and after 1840 its independence was seen to be inevitable. A silent conflict arose between those who favored ultimate annexation to the United States and the large class of property-owners who were inclined to favor the establishment of a British protectorate. In the southern part of the State, Larkin, the United States consul, was secretly endeavoring to stir up a revolt against Mexico and to bring about the extension of the jurisdiction of the United States over the country. But before his schemes had attained full maturity, a rising of the American settlers in northern California took place. On June 14, 1846, a small party of Americans, aided by John C. Frémont, who was then in California at the head of an exploring expedition, seized the town of Sonoma, raised the Bear Flag, and on the fourth of July proclaimed the independence of California. Commodore Sloat, acting under orders from the United States Government, which was then preparing to go to war with Mexico, seized Monterey and Yerba Buena (San Francisco), and the conquest of the country was completed by Commodore Stockton, Colonel Frémont, and General Kearney. On August 15, 1846, California was declared a Territory of the United States.

The discovery of gold at Sutter's Mill, near Coloma, on January 24, 1848, gave an impetus to immigration from all parts of the globe. The great body of gold-seekers, 'the Argonauts,' arrived in 1849, and by the end of the year the population exceeded 100,000. Nearly all the newcomers were unmarried men, in haste to get rich. Hence the organization of an authoritative body, responsible for public order, was neglected or hindered by the influx of lawless characters. There ensued reckless speculation, extrava-

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gant living, and easy-going morality in many localities. Stable elements, however, were not wanting—the mining camps had stringent laws of their own, and lynch law was resorted to in many quarters. Life and property, however, were not well secured. The people were heavily taxed without representation, and though San Francisco had been made a port of entry and United States customs laws had been extended over the country, no Territorial government had been granted. On November 13, 1849, after several unsuccessful attempts at State-making, a constitution, in which slavery was prohibited, was adopted by the people, and on September 9, 1850, California entered the Union. (For national events connected with the State's admission, see UNITED STATES, and CALIFORNIA COMPROMISE.) In 1851 the citizens of San Francisco formed a vigilance committee to check lawlessness in that city. The committee tried offenders, banished and hanged at its discretion, and performed its duties so efficiently that in 1856 it was reorganized to meet a new outburst of public disorder and official corruption. When the Civil War broke out, California, which was thought to be contemplating secession, was exempted from furnishing troops. The Union party, however, was dominant, and contributed nearly $1,500,000 to the Federal Government, and sent five companies of volunteers into the field.

Since the Civil War California has experienced a magnificent economic development. The completion of the Union Pacific Railroad furthered the prosperity of the State. Both from the Eastern States and from across the Pacific the tide of immigration flowed in steadily. So considerable, indeed, did the number of Chinese immigrants become that between 1870 and 1890 the Chinese question dominated State politics and influenced national legislation. In the mining districts the Chinese occupied claims which had been abandoned as exhausted by their original proprietors, or acted as cooks and menial servants. In the towns they performed various duties. Their stolid patience and their capacity for long and sustained work made them in one way ideal laborers for the development of a new country; but their extreme frugality and their willingness to work for a small wage made them formidable competitors of white labor. (See CHINESE IMMIGRATION.) In 1878 and 1879 Dennis Kearney (q.v.), a gifted agitator, taking advantage of the discontent prevailing among the lower classes of San Francisco, owing chiefly to the question of Chinese immigration, organized the Workingmen's Party, which for a short time controlled State politics and brought into being the present Constitution of California, with its many radical features. The conflict between the mining and agricultural interests over the utilization of the natural water-power of the State was removed in a great measure by prolonged and elaborate legislation on the subjects of mineral débris and drainage. In 1887 a comprehensive system of irrigation was begun, which has yielded great results. The California International Midwinter Exposition, held at San Francisco in 1894, served to illustrate the progress and prosperity of the State. Before 1860 California was Democratic in national politics. Since that date it has been Republican, with the exception of the years 1880, 1892, and 1896. In State elections California has changed from Democratic to Republican repeatedly on local issues. The trend and change of politics in California may be gathered from the following list of Governors of the State:

MILITARY AND PROVISIONAL GOVERNORS.

Col. Robert F. Stockton	1846-47
Col. John C. Frémont	1847
Gen. S. W. Kearney	1847
Col. R. B. Mason	1847-49
Gen. Persifer F. Smith	1849
Gen. Bennet Riley	1849

STATE GOVERNORS.

Peter H. Burnett	Democrat	1849-51
John McDougall	"	1851-52
John Bigler	"	1852-56
J. N. Johnson	Know-Nothing	1856-58
John B. Weller	Democrat	1858-60
Milton S. Latham	"	1860
John G. Downey	"	1860-61
Leland Stanford	Republican	1861-63
Frederick F. Low	"	1863-68
Henry H. Haight	Democrat	1868-72
Newton Booth	Republican	1872-75
William Irwin	Democrat	1875-79
George S. Perkins	Republican	1879-83
George Stoneman	Democrat	1883-87
Washington Bartlett	"	1887
R. W. Waterman	Republican	1887-91
H. H. Markham	"	1891-94
J. H. Budd	Democrat	1895-99
Henry T. Gage	Republican	1899-1903

BIBLIOGRAPHY. Bancroft, *History of the Pacific States of North America*, Vols. XIII.-XIX., XXIX., XXX. (San Francisco, 1884-90); Cronise, *The Natural Wealth of California* (San Francisco, 1868); *California as It Is* (San Francisco, 1888); Muir, *The Mountains of California* (New York, 1894); Foster, *The Gold Regions of California and also a Geographical, Topographical, and Historical View of the Country* (New York, 1848); *Gold Mines and Mining in California* (San Francisco, 1885); Hittell, *The Resources of California*, 7th ed. (San Francisco, 1879); Burnett, *Recollections and Opinions of an Old Pioneer* (New York, 1880); Van Dyke, *Southern California* (New York, 1886); Hanson, *The American Italy* (Chicago, 1896); Seward, *The Chinese Immigration in its Social and Economic Aspects* (Chicago, 1881); Vogdes, *A Bibliography relating to the Geology, Palæontology, and Mineral Resources of California*, with an additional list of miscellaneous publications on the country (Sacramento, 1896).

CALIFORNIA, GULF OF. An arm of the Pacific, separating the peninsula of Lower California from the rest of Mexico (Map: Mexico, B 2). It was originally known as the Sea of Cortez, having been discovered under his auspices and explored by himself. It is 700 miles in length, and varies in width from 70 to nearly 150 miles. It receives at its upper end the Colorado, and from the east several streams, chief of which are the Altar, Sonora, Yaqui, and Mayo. Both shores are bordered by highlands broken by the river valleys on the east, but on the west presenting an almost unbroken mountain wall. The coast-line is irregular and forms numerous small bays. The gulf has a depth ranging from 600 feet near the head to over 6000 feet near its mouth, and contains many islands, particularly in the upper part, the largest of which are Angel de la Guarda and Tiburón. On its western shores are the ports of San Felipe, San José, and La Paz; on its eastern, those of Mazatlan and Guaymas. There are pearl-fisheries on the western coast.

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CALIFORNIA, Lower, or Old (Sp. *Baja* or *Vieja California*). A peninsula in southwest North America, forming a Territory of Mexico (Map: Mexico, B 3). It extends from about latitude 22° 40′ to 32° 40′ N. It is bounded by California on the north, the Pacific on the west, and the Gulf of California and the Mexican State of Sonora on the east. Its total length is over 750 miles, while its width varies from about 30 to 140 miles. Area, 58,328 square miles. The surface is generally mountainous, the peninsula being practically an extension of the Sierra Nevada and Coast Range region. At the centre is a plateau region interrupted by mountain peaks and short ranges, Santa Catalina, in the northern central part, attaining an altitude of over 10,000 feet. An eastern coast range borders the Gulf of California, and in places attains elevations considerably exceeding 6000 feet. The western coast range, bordering the Pacific, is less elevated and seldom exceeds 3500 feet in altitude. At the extreme south the peninsula terminates in an immense mountain mass, rising in San Lázaro to 8000 feet altitude. The coasts are considerably indented, but there are not many really good harbors. The principal islands are Angel de la Guarda, off the central eastern coast, and Cedros (Cerros), off the opposite western coast. Numerous smaller islands are scattered along the southeastern coast, and a few long, narrow islands fringe the southwestern coast. The climate and vegetation of the western portion resemble those of southern California. The climate is dry and warm, the rainfall in most of the region ranging from under 10 to 25 inches, which, with a high temperature, is a small amount. Few streams occur of any importance except as irrigators. They are most numerous in the southwest. In the southern part are considerable areas of uninhabitable land. Population, in 1895, 42,245.

CALIFORNIA, Southern, University of. A Methodist Episcopal educational institution, situated at Los Angeles, California. The university was founded in 1880, and in 1901 had endowment and productive funds amounting to about $130,000, buildings and grounds valued at $70,000, an income of about $12,000, and a library of 4000 volumes and 3000 pamphlets. At the same time the collegiate and preparatory faculty numbered 92, and the total number of students, of whom over one-half were in the preparatory department, 518. In the collegiate department courses are maintained in the classics, art, oratory, music, medicine, law, and dentistry. President, George P. Bonard, A.M., D.D.

CALIFORNIA, University of. A leading American university, situated at Berkeley, California. The university was established in 1868, under the general provision for agricultural colleges made by the Congressional act of 1862, which united with it the College of California, chartered in 1869. Instruction was begun in Oakland in 1869, and the university was transferred to its present location in 1873. The government of the university is vested in the Regents of the University of California, a corporation, consisting of the higher State officers, the presidents of the State Agricultural Society, of the Mechanics' Institute of San Francisco, and of the University of California, all acting as members ex officio, and of sixteen other members appointed by the Governor of the State. The university is in effect a State institution, receiving various State appropriations for specific purposes, and in addition receiving the benefits of a tax of 2 per cent. on each $100 of assessed valuation. As a State institution, it is obliged to make reports to the Legislature, and to be under that body's general jurisdiction.

The university comprises the following departments of instruction: In Berkeley, the colleges of Letters, Social Sciences, Natural Sciences, Commerce, Agriculture, Mechanics, Mining, Civil Engineering, and Chemistry; on Mount Hamilton, in Santa Clara County, the Lick Astronomical Department; in San Francisco, the Mark Hopkins Institute of Art, Hastings College of Law, Medical Department, Post-Graduate Medical Department, Dental Department, California College of Pharmacy. Among the colleges at San Francisco, the Institute of Art, founded by Edward F. Searles in 1893, is occupied by the San Francisco Art Association, affiliated with the university and maintaining the California School of Design, founded in 1874. The Medical Department was organized in 1873 by the absorption of the Toland Medical College. The Post-Graduate Medical Department (the San Francisco Polyclinic) was affiliated with the university in 1892. The Dental Department was organized in 1888. The Lick Observatory on Mount Hamilton was founded in 1875 by James Lick, who devoted $700,000 to the purpose, among other things, of constructing "a telescope superior to and more powerful than any telescope ever made." The Department of Anthropology, organized primarily for research, conducts excavations in Egypt, Peru, and North America, and pursues linguistic and ethnological investigations.

In consideration of its official relation to the State and of the funds given to it yearly by the State, the University of California makes no charge to students resident in California for courses in the colleges of Letters, Social Sciences, Natural Sciences, Commerce, Agriculture, Mechanics, Mining, Civil Engineering, and Chemistry. The instruction in all the colleges is open to properly qualified persons, without distinction of sex. Students not residents of the State are charged a nominal fee for tuition. Since 1888, when its total student body numbered only 306, the university has grown very rapidly. A large part of this growth should probably be ascribed to the establishment and equally rapid growth of Leland Stanford Junior University, by which a friendly rivalry in educational matters was instituted. In 1902 there were 4006 students enrolled in the University of California, of whom 952 were in the College of Social Sciences, 284 in the College of Letters, 248 in the College of Mining, 194 in the College of Natural Sciences, 190 in the College of Mechanics, 186 in the Mark Hopkins Institute of Art, 156 in the Medical Department, and 171 in the College of Chemistry, 825 in the summer session, and 37 in the short course in dairying. The undergraduates numbered 2248, the graduate students 230, omitting summer-session students. At the same time there were 481 professors, instructors, lecturers, and administrative officers, of whom 201 were in the academic department. Nearly one-half of the university's students are women. A relatively large proportion of the students pursue the general academic courses, as compared

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with the technical or professional courses. It is to be noted, furthermore, that a relatively large proportion choose courses which may be termed humanistic; those namely in languages, literature, history, and philosophy. Hardly more than 5 per cent. of the student body are non-residents of the State.

In 1896 Mrs. Phœbe A. Hearst, already a large benefactor of the university, offered to bear the expenses of an international architectural competition for the purpose of securing a general plan for a great campus on the Berkeley site; and Mrs. Hearst also agreed to erect two of the necessary buildings thereon. Preliminary competitive plans were voted upon by an international jury at the Royal Museum of Fine Arts in Antwerp in 1898. The successful candidates then prepared final plans, and these were voted upon by the same jury in San Francisco in 1899. The final plan adopted was that of M. Emile Bénard, of Paris. The plan provides not only for a campus, but for a complete series of university buildings. The estimated cost of carrying out the plans in their entirety is from $10,000,000 to $12,000,000. Mr. John Galen Howard, of New York, has been appointed supervising architect. The first building which he will erect will be the Hearst Memorial Mining Building.

The present value of the buildings and grounds belonging to the University of California is (1901) $4,516,824. Its endowment and special funds aggregate $3,035,027, and its total income derived from all sources is about $550,000. The library contains over 88,000 volumes, but a strong effort is being made to increase this number largely, since the university, separated as it is from the book centres of the East, stands in relatively greater need of books than would an Eastern university.

The presidents of the university have been Henry Durant, Daniel C. Gilman, John LeConte, W. T. Reid, E. S. Holden, Horace Davis, Martin Kellogg, and Benjamin Ide Wheeler, Ph.D., LL.D., formerly professor of Greek and comparative philology in Cornell University, elected in 1899.

CALIFORNIA POPPY. See ESCHSCHOLTZIA.

CALIG'ULA. A tragedy by John Crowne, published in 1693 with a dedication to the Earl of Romney, and written in rhymed heroics.

CALIGULA, GAIUS CÆSAR AUGUSTUS GERMANICUS (12-41). Emperor of Rome from A.D. 37 to 41. He was the youngest son of Germanicus (nephew of Tiberius) by Agrippina, and was born August 31, A.D. 12, at Antium, and was educated in the camp, where the soldiers gave him the nickname Caligula, from the military boots (*caligæ*) which he wore. On the death of his brother Drusus, he was made augur in his stead; and on the death of Tiberius (A.D. 37), who, it was suspected, had received foul play at his hands, it was found that he had been appointed co-heir along with the grandson of Tiberius, but the Senate and the people allowed Caligula supreme and sole authority. In the beginning of his reign he appeared hardly likely to fulfill the threat of Tiberius, who had talked of educating Caligula "for the destruction of the Roman people." He was, to appearance, lavishly generous and merciful, pardoning even those who had been the instruments of cruelty against his own family. But this ostentatious magnanimity was itself a disease, an unwholesome affectation, founded on no principle, or even humanity of heart, and co-existed with the most savage voluptuousness and lust. Consequently, when illness, the result of his vicious life, had weakened his faculties, the lower qualities of his nature obtained the complete mastery. In addition to the senseless prodigality with which he commenced his career—expending in one year the enormous wealth left by Tiberius, 720,000,000 sesterces—he began to manifest the most barbarous propensities. He banished or murdered his relatives, excepting his uncle Claudius and sister Drusilla (with whom he carried on incestuous intercourse); filled Rome with executions, confiscating the estates of his victims; amused himself, while dining, by having victims tortured and slain in his presence; and uttered the wish "that all the Roman people had but one neck, so that he might decapitate Rome at a blow!" To vie with Xerxes, he made a bridge of ships over the bay between Baiæ and Puteoli (a distance of three Roman miles and 600 paces), and celebrated the exploit by a costly banquet on the middle of the bridge, and by collecting on it great numbers of people, and causing them to be drowned. His favorite horse was stabled in a palace, fed at a marble manger with gilded oats, was made a member of the college of priests, and afterwards raised to the consulship. As a climax to all his absurdities, he declared himself a god, and had temples erected, and sacrifices offered to himself. At length a conspiracy was formed by the officers of his guards, and he was assassinated A.D. 41. His life is told by Suetonius. See also Baring-Gould, *The Tragedy of the Cæsars* (London, 1892).

CALIGULA, BRIDGE OF. A so-called bridge prepared by Caligula to facilitate his passage from his palace on the Palatine Hills to the Temple of Jupiter on the Capitol. In reality, the 'bridge' consisted of wooden passageways leading across the streets, from roof to roof of intervening buildings.

CALIGULA, PALACE OF. The home of Caligula on the Palatine Hills overlooking the Forum. The palace was an extension of the palace of Tiberius, built over the site of the houses of Cicero and other rich men, and rising from the Nova Via to a height of 150 feet on substructures, to which the extant ruins belong. The superstructure has entirely disappeared. The best preserved portion of the remains is the crypt-porticus in which Caligula was murdered on January 24, A.D. 41.

CALINGA, kâ-lēn'gâ. A name under which various wild natives of northern Luzon are sometimes grouped. See PHILIPPINES.

CALIPERS (corrupted from *calibre;* see CALIBRE). An instrument for measuring the diameter or thickness of objects. If a pair of ordinary dividers be applied to an object so that the extreme points of the diverging legs embrace it, the distance between the points of the two legs will be the exact thickness of the object, and this distance can be determined in the usual units of length by applying the points to a scale and reading off the space subtended by them. This is the simplest form of calipers. If the dividers have a graduated arc attached, so arranged that it records exactly the distance

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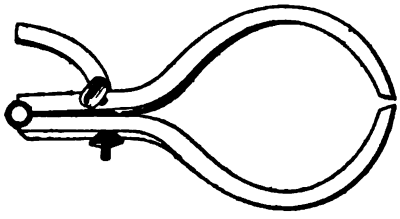
apart of the points of the legs, we then have a registering calipers. Calipers of this general form are made in a variety of shapes and with a variety of registering and adjusting devices for special purposes. Generally the legs, instead of being straight like the legs of dividers, are curved



1. SIMPLE CALIPERS.

so as to converge toward each other at the extreme points. Fig. 1 shows a form of calipers for rough measurements such as measuring the diameter of rolled rods or the thickness of rolled plates. Fig. 2 shows a form of calipers, known as micrometer calipers, for very precise measure-

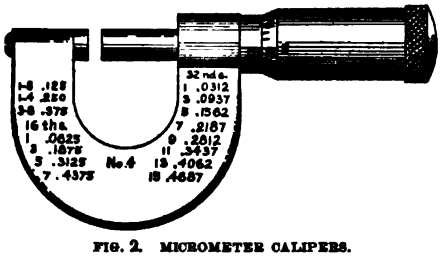


FIG. 2. MICROMETER CALIPERS.

ments. The mechanical principle embodied in the construction is that of a screw in a fixed nut. An opening to receive the work to be measured is afforded by the backward movement of the screw, and the size of the opening is indicated by the graduations. The pitch of the screw, or distance between its threads, is forty to the inch in this particular calipers, and the graduations on the barrel are forty to the inch and are figured 0, 1, 2, etc., at every fourth division. As these graduations conform to the pitch of the screw, each division equals the longitudinal distance traversed by the screw in one complete revolution, and shows that the calipers has been opened $\frac{1}{40}$ or $\frac{25}{1000}$ of an inch. The beveled edge of the thimble is graduated into twenty-five parts and is figured at every fifth division, 0, 5, 10, 15, 20, etc. Each division when coincident with the

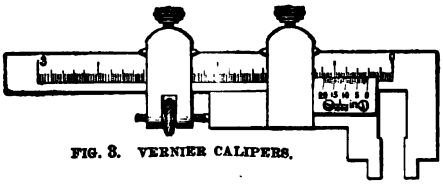


FIG. 3. VERNIER CALIPERS.

base-line of the divisions on the barrel indicates that the gauge-screw has made $\frac{1}{25}$ of a revolution and that the opening of the calipers has increased $\frac{1}{25}$ of $\frac{25}{1000}$ or $\frac{1}{1000}$ of an inch. Hence to read the calipers multiply the number of divisions visible on the scale of the barrel by 25, and add the number of divisions on the scale of the thimble from zero to the line coincident with the base-line of the graduations on the barrel. For example, as the calipers is set in the illustration, there are three whole divisions visible on the barrel. Multiplying this number by 25 and adding 5, the number of divisions registered on the scale of the thimble, the result is $\frac{80}{1000}$ of an inch. There are also special forms of micrometer calipers for the accurate measurement of V-threads on screws, bolts, etc., and calipers for measuring the depths and thickness of gear-teeth and other purposes. A common form of calipers, known as vernier calipers, is shown by Fig. 3. (See VERNIER.) See GAUGES.

CA'LIPH (Fr. *calife*, Ar. *khalifa*, successor, from *khalafa*, to succeed). The title of Mohammed's successors in temporal and spiritual power, from which the early Empire of Islam is known as the Caliphate. While the first impulse of conquest given to the Arabs by the new faith endured, the power of the caliphs was vast, covering the whole world of Islam; but with time the usual consequence followed the combining of spiritual authority with temporal dominion. The caliphate became the subject of factional strife and a prize for ambitious leaders, and rival dynasties broke Islam up into independent powers united only in enmity to the unbeliever. The first four caliphs (632-661), Abu Bekr, Omar, Othman, and Ali, were generally recognized as true successors to the spiritual authority of the Prophet, all being members of his immediate family, though under Ali, who was assassinated, there were insurrectionary movements. The Ommiads (661-750) held a more doubtful title, but still one that was recognized. With the accession of the Abbassides the Mohammedan world was divided, a survivor of the Ommiads founding in Spain the emirate (later caliphate) of Cordova. This was never a true caliphate according to Mohammedan law, but it was one of the greatest in wealth and civilization of all the Mohammedan empires. The Abbasside dynasty saw other rivals arise, the Aglabites and Edrisites in Africa, as well as minor claimants. It was the story of the feudal world everywhere—emirs seizing sovereign power whenever the opportunity offered. From the Tenth Century on, the Abbasside caliphs were mere creatures of the powerful Turkish guards, rashly organized by the Caliph Motassem (833-842). In 1258 another Motassem, the last Abbasside caliph, was put to death by Hulaku Khan (see MONGOL DYNASTY IN PERSIA). Nominal successors of the caliphs performed the spiritual functions of the office in Egypt as late as the Sixteenth Century, when the Turkish sultans reunited the spiritual and temporal headship of Islam in their own persons. There was a Shiite (q.v.) caliphate instituted in Persia in 1502. The first four caliphs had their capital at Medina; the fourteen Asiatic Ommiads made Damascus their seat of power; while Bagdad was that of the thirty-seven Abbassides. There was also established at Cairo in Egypt (909-1171) a dissenting caliphate, that of the Fatimites. Twenty-two Ommiads (756-1031) of the Spanish line ruled in Cordova. See ABBASSIDES; FATIMITES; OMMIADS; and separate articles on the greater caliphs. Consult, also: Sir William Muir, *Annals of the Early Caliphate* (London, 1883), and *The Caliphate: Its Rise, Decline, and Fall* (London, 1891), an abridgment of the *Annals*, with a continuation to the fall of

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the Abbassides; Weil, *Geschichte der Chalifen* (5 vols., Mannheim and Stuttgart, 1846-62); Syed Ameer Ali, *A Short History of the Saracens* (New York, 1899); S. Lane Poole, *The Mohammedan Dynasties* (London, 1894).

CALIP'PIC CYCLE. See PERIOD.

CAL'ISA'YA BARK. See CINCHONA.

CALIS'TA. (1) The vengeful wife of Altamont and mistress of the 'gay' Lothario, in Rowe's *Fair Penitent*. The rôle was a great favorite with Eighteenth Century actresses. (2) The wife of Cleander in Massinger and Fletcher's *Lover's Progress*. She is possessed of an intense passion for Lysander, but still remains true to her husband. The character was largely suggested by Caliste, in Daudiguier's *Lysandre et Caliste*. (3) The lady-in-waiting and confidante of Queen Berengaria, in Scott's *Talisman*. She assists in a silly and dangerous trick against Sir Kenneth, by which he is lured away from guarding the royal standard.

CAL'ISTHEN'ICS. See GYMNASTICS.

CAL'IVER (from Fr. *calibre*, calibre, bore; see CALIBRE). A matchlock or firearm about midway in size and character between a harquebus (q.v.) and a musket, and small enough to be fired without a rest or support. It could be discharged much more rapidly than a musket, but did not do as much execution. It was introduced in the Sixteenth Century and received its name from the fact that the bore was of uniform *calibre*, so that the common stock of bullets for a company might fit all weapons.

CALIXTINES, kȧ-lĭks'tĭnz. A name given (1) to the conservative wing of the Hussites (q.v.) (from Lat. *calix*, cup, chalice), because they contended for lay communion in both kinds; (2) to the followers of Georg Calixtus (q.v.) in the latter half of the Seventeenth Century.

CALIX'TUS. A name borne by three Popes. CALIXTUS I. Bishop of Rome from 219 to 223. He was born a slave.—CALIXTUS II. Guido of Vienne. Pope from 1119 to 1124. He was a son of the Count of Burgundy. He expelled the Anti-Pope Gregory from Rome in 1120, stormed the castle in which he took refuge, and made him a prisoner. He concluded with Henry V. of Germany the famous Concordat of Worms (1122), by which the long dispute over the question of investiture (q.v.) was adjusted.—CALIXTUS III. Alonzo de Borja or Borgia. Pope from 1455 to 1458. His leading idea was to institute a great crusade against the Turks, in which he failed.

CALIXTUS, GEORG (1586-1656). A German Lutheran theologian. He was born at Medelbye in Schleswig, and studied at Flensborg and Helmstädt. After traveling as an earnest student for four years in Germany, Holland, England, and France, where he made the acquaintance of the most learned men of his time, he returned to Helmstädt in 1613, and in the following year was appointed professor of theology. His genius, the depth of his knowledge, and his large experience of the world and of men, which he had acquired in his travels, developed in him a spirit of great tolerance toward all who held their religious opinions honestly, whatever these might be. Although his dissertations on the Holy Scripture, transubstantiation, communion in one kind, etc., are acknowledged by learned Catholics to be the most solid and admirable which have been composed by Protestants against the distinctive doctrines of Catholicism, he was, on account of some statements in his work entitled *De Præcipuis Religionis Christianæ Capitibus*, which seemed favorable to Catholic dogmas, and of others in his *Epitome Theologiæ Moralis*, *De Tolerantia Reformatorum*, etc., which approached too near to the Reformed or Calvinistic standpoint, declared guilty of abominable heresy by the adherents of the letter of the Concordienformel—i.e. the orthodox and dogmatically rigid Lutherans. Calixtus felt keenly that the polemical harshness of Lutheranism was a serious obstacle in the way of a great catholic Christianity, and that Protestantism must assume another form before it could hope to become the religion of Europe. Under this conviction, Calixtus endeavored to show that the oldest and most fundamental articles of the Christian faith—viz. the facts embodied in the "Apostles' Creed"—were common to all Christian sects. In subsequent dissertations, having stated that the doctrine of the Trinity was less distinctly taught in the Old than in the New Testament, and that good works were necessary to salvation, and finally, at the religious conference of Thorn in 1645, whither he was sent as a mediator by the Elector of Brandenburg, having been on more intimate terms with the Calvinistic than the Lutheran theologians, Calixtus was accused of apostasy. Fortunately, however, he had powerful friends, who stood firmly by him, and through their help he was enabled to retain his professorial chair till his death in Helmstädt, on March 19, 1656. For his biography, consult: E. L. W. Henke, *Calixt und seine Zeit* (Halle, 1853-56); W. C. Dowding, *German Theology During the Thirty Years' War;* and *The Life and Correspondence of G. Calixtus* (London, 1863).

CALKIN, kạ'kĭn, JAMES (1786-1862). An English organist and composer, born in London. He studied under Thomas Lyon and Dr. Crotch; was organist of the Regent Square Church, Gray's Inn Road, for thirty years, and was prominently identified with the Philharmonic Society in its early years, serving for some time as one of the directors. His compositions include a symphony for orchestra, an overture, several string quartets, and numerous pianoforte pieces.

CALKING, kạk'ĭng (probably OF. *cauquer*, to tread, from Lat. *calcare*, to tread in, from *calx*, heel). A process in which oakum is forced into the seams between the planks of a deck or the sides of a wooden ship in order to prevent the entrance of water. After the seams are spread, as much oakum is forced in as possible until they are nearly filled. They are then payed (i.e. filled up) with pitch, cement, or putty. Special chisel-shaped tools are used in calking, called *calking-irons*, *making-irons*, *raising-irons*, and *reeming-irons*. The edges of iron plates are also made water-tight by calking. In the case of flush edges or butts the calking-tool commonly straddles the seam; but when one plate laps another its edge is driven down by the tool against the under plate.

CALL. A term often used in reference to various theological and ecclesiastical subjects. (1) The command or invitation to believe in Jesus Christ is designated the *call of God*, or the *Gospel call*. Calvinistic theologians make a

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distinction between a *general* call and a *special* or *effectual* call. The former is addressed, they say, to all to whom the word of God comes; but it is insufficient of itself to induce any man to the act of faith, and requires for its efficacy that it be accompanied by the special and irresistible grace of the Holy Spirit. They are careful, however, to state that the general or outward calling by the word always precedes and accompanies the special and effectual calling of the Spirit. The notion of an inward call by the Spirit of God in the soul, unconnected with outward calling by the word, belongs not to Calvinistic, but to mystic theology. (2) A call to office in the Church, and particularly to the ministry of the Gospel, is regarded by Christians generally as proceeding from God; and the Church of England requires of candidates for ordination an express profession that they trust they are so moved of the Holy Ghost. (3) A call by the people who are to be under the pastoral care of a minister has been generally regarded in the Christian Church as necessary to the establishment of the pastoral relation. In established churches the matter has been complicated by patronage rights. Often in the Church of England the local congregation has had no voice whatever in the call of its minister. In Scotland the question has given rise to some of the principal ecclesiastical divisions. In the Established Church the formal acceptance of the nominated minister by the people was always professedly sought. The 'Free' Churches of England and Scotland, however, have alone secured the true supremacy of the congregation. In America, almost all denominations professedly give the call of the minister entirely into the hands of the local church or congregation; and where not professedly, even there it is actually so placed in most bodies, and the tendency is every day stronger toward the complete autonomy of the local body in this matter. See PRESBYTERIAN; CONGREGATIONALISM; METHODISM; CHURCHES.

CALL. When subscriptions to a joint stock enterprise do not require payment at once of the full amount of shares, it is frequently provided that a certain proportion shall be paid in cash, the remainder being subject to call upon the part of the management. The term call is also applied to the amount of these delayed payments. See PUTS AND CALLS.

CALL, WILKINSON (1834—). An American lawyer and politician. He was born in Russellville, Ky., but early in life went to Florida, where he became a lawyer. In the Civil War he rose to the rank of adjutant-general in the Confederate Army. He was elected to the United States Senate in 1865, but was not permitted to take his seat. In 1879 he was again elected, and thereafter served continuously, as a Democrat, until 1897.

CAL'LA (Lat., an uncertain plant). A genus of plants of the order Araceæ. The genus Calla is characterized by a flattened spathe within which is a cylindrical spadix covered with naked flowers, appearing as a mere mixture of stamens and pistils. The only species, *Calla palustris*, is found in swamps in Europe, Siberia, and North America, but not in Great Britain. It has a creeping rootstock, and heart-shaped, stalked leaves, prolonged into a point; the spathe is white, and the spadix yellow. The rootstock is extremely acrid; but, being deprived of its acridity by grinding, boiling, and macerating, is made by the Laplanders into a kind of bread called *missebroed*, which they hold in high estimation. The well-known and beautiful calla-lily (*Richardia Æthiopica*) was formerly included in this genus.

CALLAO, kä-lyä'ō (Sp. *cala*, creek, bay, from Celt. *cala*, harbor). The principal seaport of Peru and capital of the small province of the same name, situated on Callao Bay, seven miles west of Lima, with which it is connected by rail (Map: Peru, B 6). The modern city, a short distance to the north of the original town, which was destroyed in 1746, is divided into two sections, the older occupying the centre and having, to a great extent, narrow and crooked streets, while the surrounding portion is well laid out with broad avenues crossing at right angles. The buildings of the city are not particularly notable from an architectural standpoint. Callao enjoys a healthful, temperate climate. The harbor, though an open roadstead, is safe and spacious, being protected by the natural breakwater afforded by the island of San Lorenzo. It is fortified, and possesses splendid docking and ship-repairing facilities, which include a floating dock, 300 feet in length. Railway lines approach the docks. Callao has manufactures of refined sugar, lumber, and iron; but is more important as a commercial centre, its exports comprising minerals, sugar, hides, wool, bone, cotton, cocoa, etc., and the chief imports, manufactured articles, coal, and beer. The commerce has shown a considerable decrease since the decline of the guano trade. In 1900 nearly 1000 vessels (of over 50 tons), aggregating 1,315,000 tons, entered and cleared at the port of Callao. Population, in 1896, 48,118.

Callao figures in history from the times of the early Spanish conquest. It was considered a fair prize by the pirates who infested the western coast of America in the Sixteenth Century and later, and by them was attacked several times. By 1671 it had become of sufficient importance to merit the dignity of a city. An earthquake of 1687 was followed by the more disastrous commotion of 1746, which, with the accompanying tidal wave, destroyed the city and occasioned great loss of life. About the middle of the Eighteenth Century Callao was strongly fortified, San Felipe Castle playing a prominent part in subsequent wars. In 1826 the Spanish were driven from the city, their last foothold in continental America. Callao was bombarded by a Spanish fleet in 1866, and in 1880 by the Chileans, into whose power it fell the next year, after the battle of Miraflores. The treaty of 1883 restored it to Peru.

CALLAWAY, kăl'ä-wā, SAMUEL RODGER (1850—). An American railway president, born in Toronto, Canada. In 1864 he entered the service of the Grand Trunk Railway, in 1875 rose to be superintendent of the Detroit and Milwaukee Railway, and 1880 became manager of the Chicago and Grand Trunk. He was vice-president of the Union Pacific from 1884 to 1887; president of the Toledo, Saint Louis and Kansas City line in 1887-95; and of the New York, Chicago and Saint Louis in 1895-97. He was subsequently president of the Lake Shore and Michigan Southern, from 1897 to 1898, and

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of the New York Central and Hudson River Railway from 1898 to 1901, and in 1901 was chosen president of the American Locomotive Company.

CALLCOTT, kąl'kot, Sir AUGUSTUS WALL (1779-1844). An English landscape painter, born in London. He studied at the Royal Academy, and first devoted himself to portrait painting. After 1807 he exhibited nothing but landscapes for many years. In 1810 he was made a member of the Royal Academy, was knighted in 1837, and in 1844 was made conservator of royal pictures. His landscapes are remarkable for their beauty, clear definition of objects, good drawing, and truthful natural coloring. He has been called the English Claude. Among his pictures are: "Entrance to the Pool of London" (1816); "The Mouth of the Tyne" (1820); and among his figure paintings, "Milton Dictating to His Daughters" (1840) is noteworthy.

CALL'COTT, JOHN WALL (1766-1821). An English composer, born in Kensington. Too nervous to be a surgeon, as he had intended, he devoted his attention to music, and in 1785 won three of the four gold medals annually given by the Catch Club, the admired "O Sovereign of the Willing Soul" being one of the successful pieces. During the next ten years he obtained twenty of the medals given by the same society. In 1785 he was made bachelor, and afterwards (1800) doctor of music at Oxford. He studied composition with Haydn in 1790. In 1797 he issued a prospectus of an exhaustive musical dictionary, but because of his poor health could not undertake the work itself. In 1806 he published his *Musical Grammar;* in the following year his mind gave way under the continuous strain to which it had been subjected. He recovered again, but only for three years, when he relapsed, and continued insane until his death. He was one of the most eminent composers belonging to the British school of music, and especially celebrated for his glee compositions. His choicest productions were published in two volumes by his son-in-law, Mr. Horsley, in 1824.

CALL DUCK. A small beautiful breed of domestic ducks, bred in a gray and in a white variety, mainly for show purposes. The object is to make them as small and beautiful as possible. See DUCK.

CALLEJA DEL REY, käl-lā'hä dĕl rā'ē, FELIX MARIA, CONDE DE CALDERÓN (1750-1820). A Spanish general, born at Medina del Campo. He was sent to Mexico and after Hidalgo revolted defeated him near Guadalajara in 1811. In 1812 he captured the fortress of Guanajuato and murdered the revolutionists. A little later he captured Hidalgo's successor, Father Morelos, who was shot. For his cruelty in these operations Calleja was called 'the Butcher.' He was viceroy of Mexico in 1813-16, and was later ennobled. In 1819 he was selected to conduct the expedition against the Independents of Paraguay, was taken prisoner, and died soon after his release.

CALLET, kä'lā', ANTOINE FRANÇOIS (1741-1823). A French historical and portrait painter. He was born in Paris, where he obtained the first prize, in 1764, for his "Biton and Cleobis," afterwards exhibited at the Ecole des Beaux-Arts. He became a member of the Academy in 1780, soon after he had painted the fresco, "Spring," for the Apollo Gallery in the Louvre. He painted portraits of Comte d'Artois, Louis XVI., Louis XVIII., and his other works include: "Winter, or Saturnalia" (1783); "Autumn, or Fête of Bacchus" (1787); "Summer, or Fête of Ceres" (1789); "Spring, or Worship of Juno Lucina" (1791)—all of which are in the Louvre.

CAL'LIAS (Gk. Καλλίας, *Kallias*). (1) The son of Phænippus, and one of a noble and wealthy Athenian family, the members of which were hereditary torchbearers at the Eleusinian Mysteries. He was an opponent of Pisistratus, and a successful contestant in the Olympic and Pythian games. (2) The son of Hipponicus and grandson of the preceding. He was present, dressed in his priestly robes, at the battle of Marathon. He is said to have been sent, in B.C. 449, as an ambassador of Athens to Artaxerxes, and to have negotiated a treaty most unfavorable to the Persians. On his return he was impeached for having taken bribes, and fined 50 talents. (3) The son of Hipponicus and grandson of the preceding, notorious for his extravagances and profligacy. In B.C. 392 he served at Corinth, on the occasion of the defeat of the Spartan *mora* by Iphicrates, and was one of the envoys empowered to negotiate peace with Sparta, in B.C. 371. The scene of Xenophon's *Symposium*, as well as that of Plato's *Protagoras*, is laid at his house. He died in poverty.

CALLIC'RATES (Gk. Καλλικράτης, *Kallikratēs*). A Greek architect of the Fifth Century B.C., who, together with Ictinus, built the Parthenon on the Acropolis at Athens.

CAL'LICRAT'IDAS (Gk. Καλλικρατίδας, *Kallikratidas*). A Spartan, the successor of Lysander in command of the Lacedæmonian fleet against the Athenians (B.C. 406). After defeating Conon in the harbor of Mitylene, and taking thirty of his ships, and subsequently capturing the fleet of Diomedon, he was defeated, and perished by drowning in the battle of Arginusæ. When Callicratidas took command of the Lacedæmonian fleet, he was greatly hampered by the impediments thrown in his way by his predecessor. He overcame these, however, and proved himself a man of vigorous character and genuine Pan-Hellenic feeling.

CALLIÈRES BONNEVUE, kä'lyâr' bŭn'vy', LOUIS HECTOR, Chevalier de (1639-1703). A French army officer. He was Governor of Montreal in 1684, and in 1687 was leader of a part of the French and Indian forces which invaded the territory of the Five Nations in New York. He visited France to urge the seizure of New York as necessary to maintain French supremacy in Canada. In 1699 he was made Governor-General of Canada.

CALLIM'ACHUS (Gk. Καλλίμαχος, *Kallimachos*). An Athenian artist who lived near the close of the Fifth Century B.C. He made a famous gold lamp, which burned night and day in the temple of Athena Polias, on the Athenian Acropolis. He is also said to have originated the Corinthian capital. His sculptures were marked by exceeding delicacy and refinement of execution, and there is reason to believe that he was a follower of Calamis, and the first of the archaistic artists. Consult Furtwängler, *Meisterwerke der griech. Plastik* (Leipzig, 1893).

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CALLIMACHUS (c.310-240 B.C.). A celebrated Alexandrine poet and grammarian. He was born in Cyrene, of a distinguished family, which traced its ancestry to Battus, the founder of that city. With Aratus of Soli he studied at Athens, and then began teaching at Alexandria, where he enjoyed the favor of Ptolemy Philadelphus and his successor, Ptolemy Euergetes. About B.C. 260 he was appointed librarian, and held the office for some twenty years. By his teaching and writing Callimachus exerted a great influence on his time. Among his pupils were some of the most celebrated scholars of the day—Eratosthenes, Aristophanes of Byzantium, Apollonius of Rhodes, and others.

According to Suidas, he left behind him over 800 books. Of his learned works in prose, the most important were his *Tablets* (Πίνακες, *Pinakes*), in 120 books. This was a great catalogue of the works contained in the library, the authors arranged according to subject matter and date, with brief observations on the size and genuineness of the works. Through this Callimachus became the founder of the critical study of Greek literature. We know, also, of a collection of glosses, of *Memorabilia* (Ὑπομνήματα, *Hypomnēmata*), and other minor works. As a poet he won chief distinction through his elegies, so that Quintilian calls him *elegiæ principem*. His strength lay, however, in his art and learning, not in poetic genius. As an illustration of his learning may be named his four books of *Causes* (Αἴτια), in elegiac measure, which treated of the founding of cities, the origin of ceremonies, etc. One of the most famous of his elegies was *Berenice's Lock* (*Coma Berenices*), written B.C. 246, in honor of Queen Berenice, and preserved to us in Catullus's translation, No. 66. Ovid also imitated his *Ibis*, in which he had attacked his rival, Apollonius Rhodius. Famous, also, in antiquity, was his idyllic poem *Hecate*, reminiscences of which are preserved in Ovid's story of Philemon and Baucis (*Met.* 8, 610ff.). Some verses of this have recently been recovered from a wood tablet found in Egypt. There are extant in a complete state only six hymns, one of which is in elegiac form, and sixty-four epigrams. These are best edited by Meineke (Berlin, 1861) and Wilamowitz (Berlin, 1882). For the newly discovered verses of the *Hecate*, consult: Gomperz, *Aus der Hekate des Kallimachos* (Vienna, 1893); *Sammlung Papyrus Erzherzog Rainer*, Vol. VI.

CALLING THE DIET. The term used in the Scotch criminal law as equivalent to arraignment (q.v.), although the forms are different from those followed in an arraignment. In Scotland, excepting in cases of high treason, there is no indictment by grand jury, but all prosecutions for the public interest before the High Court of Justiciary, and before the sheriff's court, where the sheriff is sitting with a jury, now proceed on indictment in the name of the lord advocate. Before a prisoner can be tried the charge preferred against him must have been served fifteen days before the trial, with a list of witnesses to be examined against him, and also of the jury panel. He is therefore presumed to know the nature of the charge against him; but if it be desired by him, or by his counsel, the clerk in the first instance reads the indictment aloud in open court, the same being a formal and orderly statement of the facts which the prosecutor is prepared to prove. The prisoner is then called upon to state his objections to the relevancy of the facts alleged, and is entitled to have the question of the sufficiency of the indictment disposed of by the court before being called on to plead to the facts. This is equivalent to the demurrer (q.v.) of the English and American criminal law. If the objection is sustained, the prosecution for the time fails, and the prisoner is sent back to jail to await another indictment, unless the prosecutor chooses to abandon the case against him altogether. See DIET; INDICTMENT; VERDICT.

CALLI'NUS (Gk. Καλλῖνος, *Kallinos*). A Greek poet, born at Ephesus, an elder contemporary of Archilochus. He lived in the first half of the Seventh Century B.C., and was the first to give Greek elegy a political turn. The remains of his verse urge his fellow-citizens to resist the attacks of the Cimmerians, and to fight bravely in the struggle with Magnesia. Fragments are collected in Bergk, *Poetæ Lyrici Græci*, II. (Leipzig, 1878).

CALLIOPE, kăl-lī'ō-pē (Gk. Καλλιόπη, *Kalliopē*, the sweet-voiced). One of the Muses (q.v.). When special functions were assigned to individual Muses, Calliope was placed over poetry, and in the later schemes she is the presiding goddess of epic poetry. In the later art she is represented with tablets or a roll. In some of the mythographers Calliope appears as the mother of Orpheus or of Linus.

CALLIOPE HUMMER. A humming-bird (*Stellula Calliope*) of the United States west of the Rocky Mountains. The male is metallic green above and whitish below, with reddish flanks, and the short tail dusky; his gorget is white, the feathers tipped with metallic purplish. It is numerous and makes its nest upon pine branches near cones, which it is made to resemble. For many interesting facts and pictures illustrative of this bird and its nidification, consult Ridgway, *The Humming-Birds* (Smithsonian Institution, Washington, 1892). See Plates of HUMMING-BIRDS.

CALLIP'PUS, or **CALIP'PUS**, OF CYZICUS (Gk. Κάλλιππος, *Kallippos*). An astronomer of the Fourth Century B.C. He discovered the error in the Metonic Cycle (q.v.) of 19 years, and substituted one of 76 years, which he supposed to equal 940 lunar months and 27,759 days.

CAL'LIPY'OUS VENUS. A famous statue in the National Museum in Naples, so called from the part of her body at which she gazes. It was found in Rome, and is said to be the portrait of a hetæra.

CAL'LISTE'IA. See GREEK FESTIVALS.

CALLIRRHOË, kăl-lĭr'rō-ē (Gk. Καλλιρόη, *Kallirrhoē*). A fountain in the bed of the Ilissus, near Athens. In early times the name seems to have been given to a fountain near the market-place, where the tyrant Pisistratus erected his Enneacrounos, or fountain with nine streams. From the fountain in the Ilissus was brought the water for the marriage bath. (2) The town of Edessa (q.v.) also was called Callirrhoë. (3) The wife of Alcmæon, who, yielding to her importunities, obtained from Phegeus the necklace of Harmonia and lost his life in the enterprise.

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CALLIS'THENES (Gk. Καλλισθένης, *Kallisthenēs*) (c.360-328 B.C.). A Greek historian, born at Olynthus. He was a nephew of Aristotle, by whom he was educated, in company with Alexander the Great. He lived for the greater part of his life at Athens, and devoted himself to the study of history. Having accompanied Alexander to the East, he incurred the latter's displeasure, and was put to death (B.C. 328), on a charge of treason. Callisthenes wrote several historical works, only fragments of which have come down to us. The work on Alexander ascribed to him is a composition of a much later date.

CALLIS'TO (Gk. Καλλιστώ, *Kallistō*). An Arcadian maiden, attendant upon Artemis, whose story was told with many variations by the Greek poets. Zeus won her love, but Artemis, discovering her condition while she was bathing, either transformed her into a bear or shot her. Her unborn child, Arcas, was saved by Hermes, at the command of Zeus, and gave his name to the Arcadians. The Alexandrian poet Callimachus seems to have been the first to tell how Zeus placed Callisto among the stars as the constellation of the Bear.

CALLIS'TRATUS (Gk. Καλλίστρατος, *Kallistratos*). A famous Athenian orator, born at Aphidnæ. When Athens, in B.C. 377, undertook to form a new Athenian League, he took an active part in the movement. In B.C. 371 he accompanied the Athenian envoys to Sparta, where he urged the cause of peace. In B.C. 362 or 361 he was condemned to death, probably chiefly in consequence of disasters which had befallen the Athenians at Oropus. He went into exile at Methone, on the Thermaic Gulf, but later returned to Athens and was put to death. Callistratus was the most famous orator of his time, and his harangue on the matter of Oropus is said to have produced a profound impression on Demosthenes, who, as a boy, was present at its delivery.

CALL OF THE HOUSE. In Great Britain a Parliamentary proceeding pursued as late as 1838, for the purpose of insuring a full attendance of either House on occasions of extraordinary importance. It was the custom to give notice in advance that such a call would be made, and on the appointed day all members, under pain of incurring the displeasure of the House, were expected to answer to their names as the roll was read off by counties and boroughs. In the United States a call of the House is moved by the opponent of a measure which is about to be passed, for the purpose of showing that a quorum is not present.

CALLOSITIES. See CORNS.

CALLOT, kȧ'lō'; JACQUES (1592-1635). A French designer and engraver, born in Nancy. The family opposition to his pursuing the study of art only served as an incentive to his ambition, and after he had twice run away in order to study, and had been ignominiously brought home, he was at last permitted to go to Rome. He rose rapidly to prominence in his profession. The war scenes enacted in France at this time were portrayed by him with great vigor and freshness, in a series of pictures called "Misères et Malheurs de la Guerre." His reputation, however, rests on his etchings of genre pictures, which he treated with great originality, life, and humor. His observation was vivid and his inventive genius, with his other artistic qualities, made him preëminent in his line of work. He felt a dissatisfaction with his own productions which made him painstaking to a degree, and impelled him to draw and draw again the subject under consideration. He died March 16, 1635. He left about 1500 prints. A complete list of his works is given in M. Heineken's *Dictionnaire des artistes*.

CALL TO THE UNCONVERTED, THE. See BAXTER, RICHARD.

CALLU'NA. See HEATH.

CAL'LUS (Lat. *callum, callus*, hardened skin, hard flesh). A term in surgery for the substance that forms between the ends of broken bones during the process of repair, to hold the fragments together. It consists of new or embryonic tissue, and a large part of it is absorbed after union is complete. When the ends of the broken bones are closely approximated there is only a small bridge of callus formed between them. When the ends of the broken bones move very freely upon one another and separate widely, a large cuff or flange of callus forms, encircling and immobilizing them as a splint would. Such an ensheathing mass of callus is sometimes known as a *temporary* or *provisional callus*, to distinguish it from that portion which lies directly between the apposed fragments of bone, and which in time becomes replaced by true bony tissue. When the amount of callus thrown out is excessive, permanent injury may result to adjacent structures if subsequent absorption is only partial. Nerves and tendons may be included in the callus, or a joint may be invaded and rendered useless. Surgical operation is sometimes necessary to remove this excess of callus and restore the parts to their normal condition.

In plants, callus is a tissue usually formed in consequence of injury to woody or herbaceous stems. See ANATOMY OF PLANTS.

CALMAR, käl'mär. See KALMAR.

CALMET, kȧl'mȧ', AUGUSTIN (1672-1757). A French Benedictine, and exegetical and historical writer. He was born at Mesnil-la-Horgue, near Commercy, February 26, 1672, and in 1689 entered the Order of Benedictines. In 1698 he was appointed teacher of philosophy and theology in the abbey Moyen-Moutier; in 1704, subprior of a convent of learned monks at Münster, in Alsace; and in 1706 he went to Paris, to superintend the publication of his *Commentary on the Bible*. He was afterwards appointed prior at Lay (1715), abbot of Saint Leopold in Nancy (1718), abbot of Senones in Lorraine (1728), and died in Paris, October 25, 1757. His exegetical writings have been commended and studied with advantage by both Roman Catholics and Protestants. The *Commentary on the Bible* (23 vols., Paris, 1707-16), though marred by the author's deficient knowledge of the Oriental languages, contains valuable researches in biblical antiquities. Calmet's *Historical and Critical Dictionary of the Bible* (4 vols., Paris, 1722-28) was translated into English, German, and other languages, and has passed through many editions. His other works—a *History of the Bible*, and of the *Jews* (1718), and a *Universal History* (1735-71)—are mere compilations; but his *History of Lor-*

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raine (Nancy, 1728, 4 vols.; 2d ed. 1745-47, 6 vols.) is founded on original researches. Solid criticism and independent judgment are wanting in all his works. For his life, consult: Fangé (Senones, 1762); A. Digot (Nancy, 1861); and on his correspondence, P. E. Guillaume (Nancy, 1875).

CALM LATITUDES. The portion of the ocean which lies between the northern and southern trades, and where calms of long duration are likely to prevail. They vary with the season of the year and the consequent shifting of the trade-wind belts. The term is also applied to the region along the polar edge of the trade-wind belts, which is called the Horse Latitudes. See DOLDRUMS.

CALMON, kâl'môn', MARC ANTOINE (1815-1890). A French statesman. He was born in Tamniès (Dordogne), and studied law in Paris. In 1871 he became Under-Secretary of State in the Department of the Interior, and in December, 1872, he was appointed prefect of the Department of the Seine, which position he held until the downfall of the Thiers Ministry. In 1873 he was elected to the National Assembly. His valuable works on political economy include the following: *Les impôts avant 1789* (1865); *William Pitt, étude financière et parlementaire* (1865); *Histoire parlementaire des finances de la Restauration* (1868-70); *Etude des finances de l'Angleterre depuis la réforme de Robert Peel, jusqu'en 1869* (1870). He also edited Thiers's *Discours parlementaires* (15 vol., Paris, 1879-83).

CALOMARDE, kâ'lô-mär'dâ, FRANCISCO TADEO, Count (1775-1842). A Spanish statesman. He was born at Villel, in Aragon, studied in Saragossa, and became an advocate. During the wars of Napoleon he remained loyal to the national cause, and after the expulsion of the French and the return of Ferdinand VII. in 1814, Calomarde was among the first to hurry to Aragon and do homage to him as absolute monarch. As a reward of his obsequious celerity he obtained a post in the Council for the Indies, but lost it on account of accepting a bribe. On the restoration of the Constitution in 1820 he unsuccessfully courted the favor of the Liberals; but when the French Army in 1823 restored the authority of Ferdinand VII. Calomarde was appointed secretary of the *cámara del real patronato,* one of the most influential offices in the kingdom. Not long after the King made him Minister of Justice. While he held this office he showed himself an uncompromising enemy of free thought and progress, and a friend of the old ecclesiastical supremacy. He also secretly favored the party of Don Carlos, but by treating any unseasonable outbreak with great cruelty he preserved himself from the suspicion of being implicated in Carlist schemes. In 1832, when Ferdinand was supposed to be on his death-bed, he was prevailed on by Calomarde to reintroduce the Salic law, by which the Infanta Isabella was excluded from the throne, and Don Carlos, the favorite of the Absolutists, was appointed successor. The unexpected recovery of the King frustrated Calomarde's schemes, and he fled in disgrace to France. He died in Toulouse. Consult Cardenas, *Vida de Calomarde* (Madrid, 1841-49).

CAL'OMEL (Gk. καλός, *kalos,* beautiful + μέλας, *melas,* black; so called because white though prepared from black substance). The popular name given to one of the compounds of mercury and chlorine, and known as the subchloride or mild chloride of mercury, with the symbol Hg_2Cl_2. It is a heavy, white, tasteless and odorless powder, insoluble in water, ether or alcohol. It is used in medicine principally to stimulate the flow of bile in the case of a sluggish liver, or to unload the intestines (with the help of a saline cathartic), or to carry off fermenting substances in the digestive tract. It is a valuable adjunct to quinine in malarial fever. The medicinal dose of calomel is from one-half a grain to ten grains. Excessive doses, or the retention in the system of one large dose, cause swelling of the tongue and gums, and salivation. See MERCURY.

CALONNE, kâ'lŏn', CHARLES ALEXANDRE DE (1734-1802). French Minister of Finance under Louis XVI. He was born January 20, 1734, in Douai. As advocate-general, procurator-general and intendant, he had displayed many brilliant but unsubstantial qualities, when, in 1783, at the instance of his patron, Comte d'Artois, and Marie Antoinette, he was summoned by the King to become Comptroller-General of the Finances. The treasury then was in hopeless disorder, and the whole financial system of the kingdom was inadequate to meet the demands of the extravagant Court and administration. Calonne's policy, whereby he hoped to give satisfaction where the others had not, is best exhibited in his own words: "A man who wishes to borrow money must appear to be rich, and in order to appear rich it is necessary to make a display of expenditure. Economy is doubly fatal; it warns the capitalists not to lend to a treasury involved in debt; it causes the arts to languish, while prodigality enriches them." Thus he won the enthusiastic admiration of the Court, by actually encouraging that extravagance which he regarded as necessary to bolster up credit. When the Queen came to him for an unusually large sum of money, he is said to have replied: "What you wish, madame, shall be done, if it is possible; and if it is not possible—it shall still be done!" But Calonne soon found that public credit requires some more substantial foundation than mere display. Both credit and taxation had reached their absolute limits. A crisis had arrived, with which neither Minister nor King could deal. An Assembly of Notables was therefore called and Calonne opened its session in February, 1787, with a glowing account of the national prosperity, but urged the necessity of certain reforms in taxation. The Notables required an account, which revealed his mismanagement, and he was dismissed and exiled. He died in 1802. Consult the authorities referred to under FRANCE for this period.

CAL'OPHYL'LUM (Neo-Lat., from Gk. καλός, *kalos,* beautiful + φύλλον, *phyllon,* leaf). A genus of trees of the order Guttiferæ, natives of warm climates. Some of the species yield valuable timber, as the piney-tree (*Calophyllum angustifolium*), which grows at Penang and in the islands to the eastward of the Bay of Bengal, attaining large proportions in ravines and narrow, moist valleys, and furnishes the beautiful straight spars called 'Poon.' The resinous products of some species are valuable, and among

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them are some of the substances known by the name of Tacamahaca. *Calophyllum inophyllum* is a very large and beautiful umbrageous tree, often planted for its shade and the fragrance of its flowers, which are white and in loose axillary racemes. It is one of the most valuable timber-trees of the South Sea Islands. The timber resembles mahogany, being of equally close texture, although of lighter color, and very durable. The leaves are oblong and obtuse; the fruit is a globose drupe or stone-fruit, about the size of a walnut, and a fixed oil is expressed from its kernel, which is used for lamps, etc. In the Hawaiian Islands this oil is extensively applied to bruises and in rheumatism. A similar oil is expressed from the seed of *Calophyllum calaba*, a native of Ceylon, which also has white sweet-scented flowers, and whose timber is used for various purposes, particularly for staves, cask-headings, and house-building. Considerable difference of opinion exists as to the species producing the Tacamahaca resin and the Poon spars. The more recent authors state that *Calophyllum calaba* yields the true Tacamahaca and *Calophyllum inophyllum* a resin quite similar. Doubtless several species furnish the Poon Spars. There are a number of other species, some of which yield heavy, durable timber that is valuable for engineering purposes.

CALOR/IC (Fr. *calorique*, from Lat. *calor*, heat). An early term for heat, when it was considered an invisible, imponderable fluid. See HEAT.

CALORIC ENGINE, or HOT-AIR ENGINE. An engine in which the pressure acting on the piston is produced by increasing the temperature of air through the application to it of heat by transfer through a separating metal wall. This definition distinguishes the hot-air engine from the compressed-air engine (see COMPRESSED-AIR ENGINE) on one hand, and the internal combustion engine (see GAS-ENGINE) on the other hand. There are, however, hot-air engines which employ both previous compression and internal combustion. The action of hot-air engines, like that of all other heat-engines, consists in admitting the air at a high temperature and pressure, and by allowing it to perform work on the piston reduce its pressure and temperature, after which it is either exhausted into the atmosphere and a fresh supply is introduced, or else it is again heated for a repetition of the former process. In their principal working parts hot-air engines are very similar to ordinary steam-engines. The heated air is introduced into a cylinder in which works a tightly fitting piston, which is thus compelled to move up and down and transfer its motion to a revolving shaft by means of piston and connecting rods and the other usual mechanisms of steam-engines. (See STEAM-ENGINE.) Hot-air engines are of several types, which may be described and explained as follows: Closed-cycle engines are those which operate continuously with the same mass or weight of air, only taking in a fresh charge to replace leakage or to increase the mass in use. Open-cycle engines are those in which at each stroke a new charge is drawn in from the atmosphere, and after being heated and expanded is exhausted again into the atmosphere. Regenerative and non-regenerative engines are those which, respectively, use or do not use a regenerater to absorb the heat of the exhaust air and to restore it to the incoming cooler air. Finally, closed-cycle engines may be divided into two sub-classes, which differ by having the temperature change take place in the air at constant pressure or at constant volume. Each of these types is identified with the name of some designer or engineer. Hot-air engines have been designed in great numbers, but the limited extent to which they have been used makes most of them but little more than names. The hot-air engine as defined at the beginning of this article seems to have been invented by the Rev. Robert Stirling, an Englishman, in 1816. His first successful engine was built in 1827, and one afterwards was used in a foundry in Dundee, Scotland, developing 20 brake horse-power on the consumption of 50 pounds of coal per hour. In this engine, shown diagrammatically in Fig. 1, the same volume of air was alternately heated

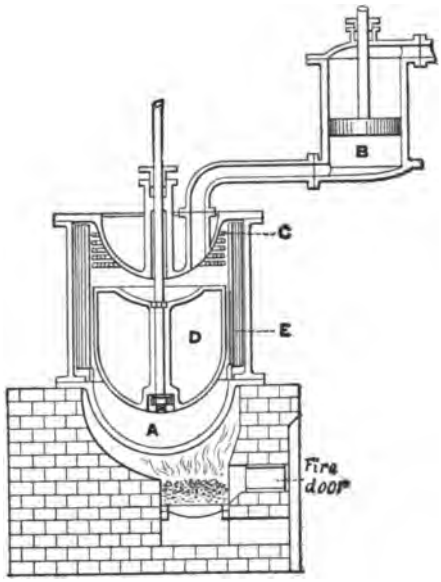

FIG. 1. STIRLING HOT-AIR ENGINE.

and cooled, producing a variation of pressure which actuated a working piston. The heating and cooling were effected by changing the air by means of a plunger, *D*, from end to end of a cylinder, *A*, one end of which was kept hot by a fire and the other cool by a coil of water-pipe, *C*. On its way from end to end the air passed through a passage partly filled with thin plates of metal, *E*, which alternately absorbed the heat from the air and gave it back on the return. This was the first application of the economizer or regenerator, and its invention is said to be due to James Stirling, a civil engineer. This engine failed through the giving out of the heaters, which required to be kept red-hot. In 1844 Franchot, a Frenchman, patented an arrangement of the Stirling engine with large and efficient heating and cooling surfaces. Further attempts at improvement were made by Rankine and Napier, and by Professor Jenkin in England, and also by Lauberau in France. The Stirling engine belongs to the type of hot-air engines with temperature changes at constant volumes. Another hot-air engine which has much the same classic and historical interest as the Stirling engine is that invented by John

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Ericsson (q.v.). The engines of Ericsson differed from the Stirling engine in that they drew their supply of air from the atmosphere at each stroke, heated it, allowed it to expand while doing work, then exhausted it again into the external air; they belonged to the type of hot-air engine with temperature changes at constant pressure. The first engine was installed in the ship *Ericsson* in 1852, but the idea dates from 1833, and it enjoys the distinction of having been built on the largest scale and of having made the most noted failure of any hot-air engine. To Ericsson is to be credited also the term 'caloric engine,' which he applied as a sort of trade name to his invention. Briefly described, Ericsson's first engine was designed for a 2200-ton seagoing ship; it was intended for 600 horse-power, but actually ran at about 300 horse-power. There were four cylinders, each 14 feet in diameter and having 6 feet stroke, and the engine ran at nine revolutions per minute. As stated above, the engine proved a failure after several attempts had been made to remedy its faults. First the 14-foot cylinders were removed and replaced by others, which also failed; and finally the engine was replaced entirely by a steam-engine. Afterwards Ericsson made another attempt to drive a ship by an air-engine. The *Primera* was built and fitted with horizontal engines drawing their supply from, and exhausting into, an artificial atmosphere of high pressure. As in the former attempt, however, the

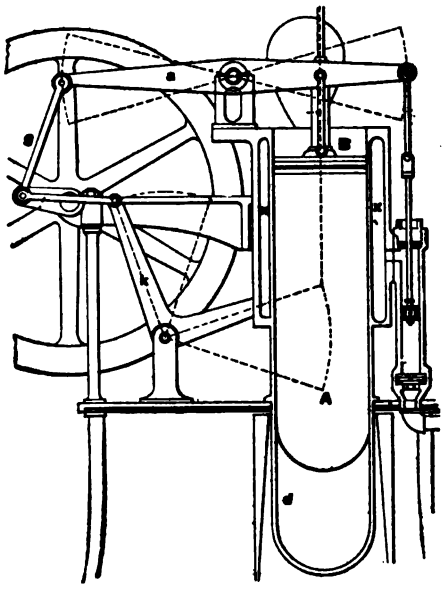

FIG. 2. ERICSSON CALORIC ENGINE.

heating surface proved inadequate and the available pressure was too small to give much power, so that again steam was substituted after a short trial. Economizers were employed with both of his large engines, but in the small engines, to the design of which Ericsson turned his attention after the failure of his large motors, the economizer was abandoned. Ericsson's first design for a small motor was brought out in 1860, and in 1880 the latest form for pumping purposes was produced. Fig. 2 shows this type of engine. The fire of coal or gas is below the cylinder *d*, which is water-jacketed at the upper end. *x x*. In tank pumping engines, the pumped water circulates through the water-jacket. At *A* is the hollow displacing piston, and *B* is the working piston proper. The displacer is coupled to the bell crank *k*, and so to the crank *e*, to which the beam *a* is linked directly by *g*. These engines do not use less fuel than steam-engines of similar size, but as they require no water or licensed engineer, they have come into considerable use.

The Stirling engine and the Ericsson engine between themselves embodied all the characteristic features of the several types of hot-air engines defined above. The Ericsson engine is an open-cycle, non-regenerating engine, with temperature changes at constant pressure; the Stirling engine was a closed-cycle, regenerating engine, with temperature changes at constant volume. The hot-air engines produced by other inventors of this kind of prime motor have resembled sometimes the Ericsson engine and sometimes the Stirling engine, but have had the details of operation worked out in different ways. Two of these only need be mentioned for the purpose of illustration: The Wilcox engine, of which large numbers were made about 1860 to 1865, was, like the Ericsson ship engine, an open-cycle, regenerative engine, with temperature changes at constant pressure. Its distinctive characteristic was a peculiar supply cylinder fitted with a piston operated from the main shaft. This supply cylinder took in the atmospheric air and passed it through the regenerator to the operating cylinder, where it was heated and expanded to perform its work, after which it was exhausted through the regenerator into the external air. The Merrill engine, one of which of 10 horse-power was used for some years previous to 1885 to run a factory at Winchendon, Mass., worked on the same principle as the Stirling engine: that is, it used the same volume of air over and over. It had two working cylinders, each of which was double-acting (see STEAM-ENGINE), and two reverser plungers, which affected the transfer of the air between the heating and cooling devices.

Mention was made at the beginning of this article of hot-air engines employing previously compressed air. These are commonly known as compression engines. In them a constant quantity of air is constantly changed in volume, being compressed while cold and expanded while hot. There are usually two cylinders, one cold and kept cold by a water-jacket or other means, and the other hot and kept heated by external means. The piston in the hot cylinder is generally timed from one-sixth to one-quarter revolution in advance of that in the cold cylinder, whereby the air is first changed into the cold cylinder, sometimes through a regenerator, then compressed therein, then changed to the hot cylinder back through the regenerator, taking up again the stored heat, and finally expanded in the hot cylinder. The first engine of this kind seems to have been invented by Charles Louis Felix Franchot, a Frenchman, in 1853, and it is deserving of brief mention for the clear manner in which it illustrates the working principle. Hot and cold cylinders of different areas were placed side by side, as shown by Fig. 3, with their pistons connected to cranks 135° apart. The bottom of the cold cylinder, *A*, was connected to the

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top of the hot cylinder, *B*, and vice versa through heating and cooling chambers, *C* and *D*, containing Stirling regenerators. The arrangement of

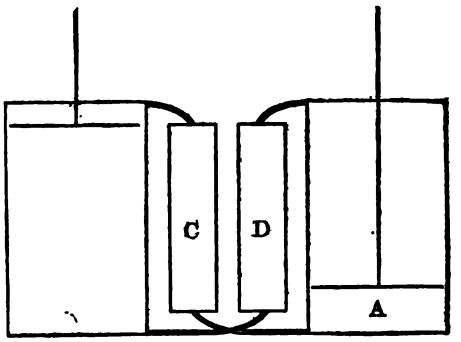

FIG. 3.

the pistons was such that the air was compressed in the cool cylinder; passed through the regenerator into the hot cylinder, where it was expanded; then transferred to the cold cylinder through the cooling chamber, and the cycle repeated. From four to six cylinders, each double-acting, were proposed to be combined in a series. A model of

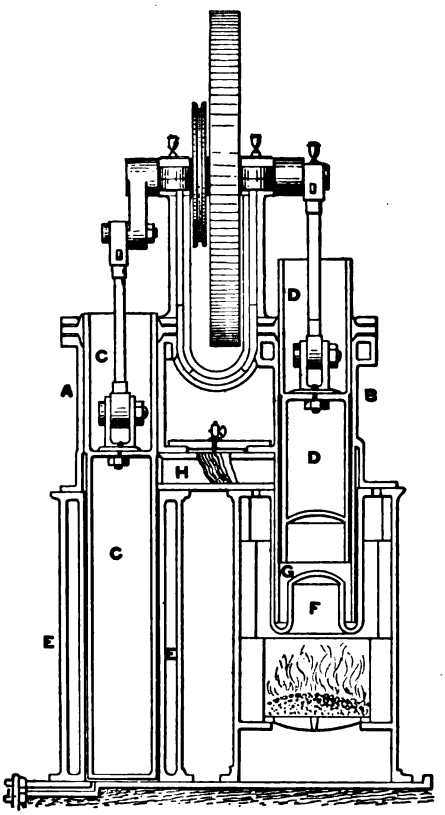

FIG. 4. RIDER CALORIC ENGINE.

one of these engines was exhibited at the Paris Exposition of 1855. This same principle was embodied in an engine patented by the famous engineer Sir William Siemens, in 1860, but he neglected to put it into practical use. The Siemens engine employed four cylinders, each hot at one end and cold at the other, all connected to one shaft, and so arranged that the hot end of one communicated through a regenerator with the cold end of the next. The heat was supplied by hot products of combustion from producer gas in a chamber connected with the hot ends of the cylinders, while the opposite ends were fitted with refrigerating devices. One of the latest forms of compression engines is the Rider, shown by Fig. 4. In this sectional view *C* is the cold cylinder or compression cylinder, surrounded by the water-jacket, *E*, and *D* is the hot cylinder. The compressed air from the cold cylinder is changed through the regenerator, *H*, to the hot cylinder, where it is expanded by the heat from the grate underneath the cylinder.

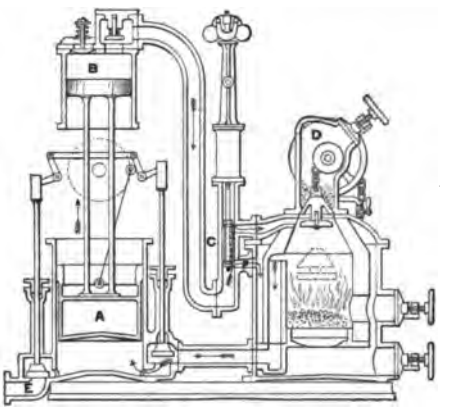

FIG. 5. HOT-AIR PRODUCT OF COMBUSTION ENGINE.

Hot-air engines employing internal combustion, like compression engines, form a separate class of this type of motor. At the outset of their consideration, however, it is important to note a somewhat arbitrary distinction between them and the internal combustion motors known as gas-engines. The true gas-engine is limited generally to internal-combustion engines, in which the air, mixed with gas or with oil-vapor, is admitted to the cylinder and ignited after its admission. Liquid or gaseous fuels are essential in this type of engine. Hot-air internal-combustion engines, or, more properly, hot-air products of combustion engines, operate by forcing atmospheric air through a closed fire, which may be and generally is a solid fuel fire, and carrying the air and gases of combustion to the engine cylinder. One form of such air-engines is shown by Fig. 5. The furnace was placed in a chamber strong enough to withstand the pressure. The compressing pump *B* forced air below the ash-pit up through the fire, where it was expanded by heat and by combustion with carbon. Being admitted to the working cylinder against the piston, it was exhausted into the chimney. The furnace had to be charged with fresh fuel through a combination of double doors, *D*, working on the principle of an air-lock. A hot-air product of combustion engine was described by Sir George Cayley, an Englishman, in 1807 and 1825, and again in 1837 this inventor patented a modification of the same design and built several engines, none of which gave any marked success. In 1821 Dr. Neill Arnott (q.v.), the celebrated scientist, took up the same idea and patented a form of engine in which, to avoid the abrading action of

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the ashes on metal pistons and cylinders, he used oil pistons. Following Cayley and Arnott, a number of inventors worked on the idea, among them being the Americans Stephen Wilcox, S. H. Roper, and Philander Shaw, each of whom built and sold a number of engines. Broadly speaking, the difficulties of operating these engines were so great that they recorded a general failure. These difficulties were caused by flue-dust and the grit in the cylinders, the rapid destruction of the working surfaces and valves by the intense heat, and the practical impossibility of lubrication. They were also more bulky than other types of hot-air engines in proportion to the power developed.

The possibilities of the hot-air engine as a competitor of the steam-engine are often urged, but so far it has never reached any practical success which warranted much hope that the competition would prove serious. The two sides of the question are fairly and concisely summarized by Prof. F. R. Hutton as follows:

"The hot-air engine in small sizes is more economical than the steam-engine of the same capacity. In larger sizes it has about the same economy as the less economical steam-engine, measured in coal consumed per horse-power. It has the advantage of avoiding the steam-boiler as a magazine or reservoir of energy which may be liberated by accident so suddenly as to be explosive. It can be run by less skilled and expensive labor, and no steam-runner's license is demanded. It is safe and odorless. The objections to the hot-air engine are the greater bulk and greater weight for the same power than is required with the steam-engine; the low mean pressure with high initial pressure, which latter compels great strength of structure; the deterioration of heating surfaces exposed to high heats and consequent oxidation; the difficulties of packing and lubricating at high temperatures; the difficulty of regulation closely to varying resistances. If there is any danger to the present supremacy of the steam-engine, it will be in relatively small plants that a hot-air engine can be a substitute; the gas or internal-combustion engine is more to be feared than the hot-air engine proper."

A theoretical and practical discussion of hot-air engines and heat-engines generally is contained in Hutton, *Heat and Heat-Engines* (New York, 1899).

CAL'ORIM'ETRY (from Lat. *calor*, heat + Gk. *μέτρον*, *metron*, measure). The science of the measurement of quantities of energy when manifested by heat effects. By the name 'heat effects' is meant the changes produced in material bodies when they are exposed to what is called a 'source of heat,' e.g. a flame or the rays of the sun. Among these changes which may take place are expansion, fusion, evaporation, alteration in electrical and magnetic properties, etc. It is now believed that these changes are occasioned by increase in the energy of the smallest portions of the bodies. When a body is 'heated' or 'warmed,' we mean that its minute parts gain energy; and opposite changes, e.g. freezing, condensation, cooling, etc., take place when these parts lose energy. It is the province of calorimetry to measure these amounts of energy gained or lost.

The *erg* (see MECHANICAL UNITS) is the unit of energy and work, and therefore all quantities of energy should be measured in terms of it; but it rarely happens that heat effects are due directly to mechanical work except in case of friction. Consequently the erg is not a convenient unit. Heat effects and the energy required to produce them are almost invariably compared with one definite heat effect, viz. rise in temperature of water; and the practical unit employed for measuring thermal energy may be defined as the quantity of energy required to raise the temperature of one gram of water from 15° to 16° C. on the thermometric scale of the constant-pressure hydrogen thermometer. (Other definitions of a practical unit have been proposed, e.g. by the substitution of 20° to 21° in place of 15° to 16° C.; or the one-hundredth portion of the quantity of energy required to raise the temperature of one gram of water from the freezing-point to the boiling-point under normal pressure.) This practical unit is called the *calorie*, and its value is very nearly 4.187 joules, or 4.187×10^7 ergs. See HEAT.

By the 'specific heat' of a substance at a given temperature and under definite conditions is meant the number of calories required to raise the temperature of one gram of the substance one degree by the hydrogen scale (see THERMOMETER), at that temperature, and under those conditions. By the 'latent heat' of a substance for a definite change of state (e.g. fusion, evaporation, sublimation, dissociation), under definite conditions, is meant the number of calories required to produce the particular change of state in one gram of the substance under the specified conditions. Thus we speak of the 'specific heat of air at constant pressure,' or the 'latent heat of evaporation of water at normal atmospheric pressure.' In general, however, we can learn simply the *average specific heat*, i.e. the number of calories required to raise the temperature of one gram through t degrees, divided by t. Calorimetry is, then, chiefly, the science of measuring specific and latent heats.

There are two general methods for the measurement of specific heats, which may be regarded as satisfactory—the method of mixtures and the use of an ice or a steam calorimeter. In the method of mixtures a known quantity of the substance at a known temperature is mixed with a known quantity of some liquid at a different known temperature and the temperature of the mixture is observed. The specific heat of the liquid for the given range of temperature being known, and allowance being made for losses by radiation and conduction, and for the calories spent in changing the temperature of the vessel containing the liquid, the specific heat of the substance may be at once deduced. The most improved form of apparatus for use in this method is that of Prof. T. A. Waterman, a full description of which is given in the *Physical Review*, Vol. IV., p. 161 (1896).

In the ice-calorimeter, the substance whose specific heat is desired is introduced into an apparatus which allows the heat energy withdrawn from the body to be spent entirely in melting ice. The change in temperature of the substance and the quantity of ice melted may be observed; and thus, assuming that the latent heat of ice is known, the specific heat of the substance may be calculated. This method is due to Black; and the most improved apparatus is that designed by the late Professor Bunsen, of Heidelberg. The most accurate method of using

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the 'Bunsen calorimeter' is that of Dr. Dieterici, of Hanover. (See *Wiedemann's Annalen der Physik und der Chemie*, Vol. XXXVII., p. 494, 1889.) Fairly satisfactory descriptions are given in almost all general text-books on physics. In the 'steam-calorimeter' the substance whose specific heat is desired is suspended on one pan of a chemical balance, which is inclosed in a box connected with a steam-boiler; if the steam is suddenly admitted, some of it will continue to condense on the pan and the substance until their temperature is raised to that of the steam. The quantity of steam thus condensed may be weighed by placing weights in the other pan of the balance, and, if the latent heat of condensation of steam is known, the specific heat may easily be calculated. This method is due to Professor Joly, of Dublin, and a full description of the latest improvements may be found in the *Philosophical Transactions of the Royal Society of London* (1894). In all these methods it should be noted that what is measured is the *average specific heat* of the substance over a given range of temperature. For other methods of measurement of specific heat, reference may be made to the larger treatises on physics.

To measure the latent heat of fusion two methods have been used successfully; one is an obvious application of the method of mixtures; the other is to secure the fusion by means of the heating action of an electric current, whose intensity and electromotive force may be measured, thus giving the quantity of energy consumed in producing the fusion.

To measure the latent heat of evaporation, two similar methods have been used, and a third also. If the vapor is conducted through a long spiral tube surrounded by water, the vapor will condense, the temperature of the water will be raised, and thus we have simply the method of mixtures. Or a liquid may be made to evaporate by means of a reduced pressure, and the consequent fall of temperature may be balanced by the heating action of a known electric current. Again, if a liquid inclosed in a Bunsen calorimeter is caused to evaporate, the surrounding water will be frozen—just the reverse of the general use of the apparatus—and the quantity frozen may be measured. For full description of these various methods for measuring latent heats of all kinds, reference should be made to general treatises on heat. Preston, *Theory of Heat* (London, 1894), is perhaps the best book of reference.

Another class of calorimeters is designed to enable the observer to ascertain the number of calories furnished when certain fuels, such as coals, oils, etc., are allowed to burn under definite conditions. In these the coal is placed in a hollow steel cylinder which can be tightly closed, oxygen is admitted under high pressure, and combustion is started by means of an electric current through a fuse wire. The cylinder is kept immersed in water, the rise of temperature of which is observed, and the energy generated thus measured. Calorimeters constructed on a large scale are used to measure the amount of heat given off by an animal or human being, the amount of food and air supplied to the subject of the test being recorded. Prof. W. O. Atwater, of Wesleyan University, has carried on a number of experiments with such an instrument, and has ascertained the fuel value of various foods. His results are to be found in a series of bulletins issued by the United States Department of Agriculture.

CALOTTISTES, kà'lô'têst' (Fr. *Calottiste*, from *calotte*, dimin. of OF. *cale*, cap.) A society of wits and satirists in the time of Louis XIV. and Louis XV., known as the *Régiment de la Calotte*. They were headed by two officers in the King's bodyguard, named Torsac and Aymond. Their amusement consisted in sending to any public character who had exposed himself to ridicule a 'patent' authorizing him to wear the *calotte* as a covering for the weak part of his head. The armorial bearings of the *Régiment de la Calotte* consisted of various symbols of folly, with the mottoes *C'est regner que de savoir rire*, and *Favet Momus, Luna Influit*. When Torsac, its first 'generalissimo,' died, the society, which occupied a position of satirical hostility to the French Academy, drew up a burlesque funeral oration, manufactured out of the pompously eulogistic phrases which the academicians were in the habit of using. As the society became more audacious and did not spare even royalty itself, it was dissolved by the Minister, Fleury. The *Mémoires pour servir à l'histoire de la Calotte* (Basel, 1725) is an amusing little book. During the Bourbon Restoration the title *Régime de la Calotte* was applied to the priestly administration of affairs.

CAL'OTYPE (Gk. *καλός*, *kalos*, beautiful, + *τύπος*, *typos*, impression). A name applied to one of the earliest processes for producing photographic prints, as well as to the prints themselves. The process was invented by Henry Fox Talbot in 1840. It consists of the following operations. A sheet of good plain paper with a smooth surface and a close and even texture, is washed by means of a soft brush with a solution of 100 grains of crystallized silver nitrate in 6 ounces of distilled water. The paper is allowed to dry in a dark room and is then dipped into a solution of potassium iodide made by dissolving 500 grains of that salt in a pint of water. After a few minutes it is removed and then dipped into water and dried. This 'iodized paper' is exceedingly sensitive to light, and may be kept for some time if it is carefully protected from sunlight. When required for use, a sheet of it is washed in a mixture which Mr. Talbot called gallo-nitrate of silver. The mixture is obtained by adding a saturated solution of gallic acid to an equal volume of a solution of 100 grains of crystallized silver nitrate in 2 ounces of distilled water, to which one-sixth of its volume of strong acetic acid had been added. After the iodized paper has been washed over with this solution it is dipped into water and then cautiously dried with blotting-paper. An exposure of less than a second in diffused daylight is sufficient to obtain an impression. In order to develop the impression the paper is again washed with gallo-nitrate of silver and dried near a fire, the exposed portions becoming brown, while the covered portions retain their original color. The picture is then fixed by consecutively washing it in clean water, drying, washing in a solution of potassium bromide (100 grains in 8 ounces of water), washing in water to remove any surplus iodide solution, and finally drying.

The calotype process has been superseded by other processes, and is at present hardly ever used. See PHOTOGRAPHY.

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CALO'VIUS, ABRAHAM (1612-86). A German Lutheran theologian, whose real name was Kalau, born in Mohrungen, East Prussia. He became rector of the gymnasium in Danzig (1643) and later professor of theology in Wittenberg (1650). He was a strong polemical writer; his chief works were *Systema Locorum Theologicorum* (12 vols., 1665-77), and *Biblia Illustrata* (4 vols.).

CALPE, kăl'pê. One of the pillars of Hercules, now the Rock of Gibraltar.

CALPEE, or **KALPI,** kal'pê. A city in the Jalaun district of the Northwest Provinces of British India, on the right bank of the Jumna, in latitude 26° 7′ N. and longitude 79° 48′ E. (Map: India, C 3). Population, 12,700. It is an entrepôt for the rice and cotton of the neighboring district, and has manufactures of cotton, paper, and sugar. It is 51 miles southwest of Cawnpore, and is closely linked with it in the history of the insurrection of 1857-58.

CALPUR'NIA. A character in Shakespeare's *Julius Cæsar*. The rôle is drawn after the historic daughter of Calpurnius Piso Cæsoninus, and last wife of Julius Cæsar. In the play she receives portents of the impending tragedy and tries to dissuade Cæsar from going to the Senate house.

CALPURNIA GENS. See CALPURNIUS.

CALPUR'NIUS. The Calpurnia gens was, by its own account, one of the oldest plebeian clans in Rome; but it does not figure in history till the time of the First Punic War. The family names, in the time of the Republic, were Bestia, Bibulus, Flamma, and Piso.—MARCUS CALPURNIUS BIBULUS is known as the hostile and incapable colleague of Cæsar (B.C. 59) in the consulate. He was put up by the aristocratic party, who spent vast sums to carry the election. He finally joined the Pompeian party, had command of the fleet intended to prevent Cæsar's passage to Greece, and died B.C. 48, before the battle of Dyrrhachium. Among the Roman women of this family, two are celebrated—CALPURNIA, the daughter of Calpurnius Piso (consul B.C. 58), and the last wife of Cæsar, who seems, from the scanty notices of her we possess, to have been a quiet domestic woman, full of love and solicitude for her great husband; and CALPURNIA, the daughter of L. Calpurnius Bestia, wife of P. Antistius, who killed herself when her husband was murdered by order of the younger Marius, B.C. 82.

CALPURNIUS, TITUS, surnamed SICULUS. A little-known pastoral poet of the reign of Nero (A.D. 54-68). He was the author of seven eclogues in close imitation of Vergil, but exaggerated and artificial. These have been edited by Schenkl (Leipzig, 1885) and Keene (London, 1887), and translated by Scott (London, 1890).

CALTAGIRONE, kăl'tä-jê-rō'nâ (from Ar. *Kalat-al-Girche*, fortress of Girche, a Saracen general, who captured the place in the Eighth Century). A city of Sicily, 57 miles southwest of Catania. It stands 2000 feet above the sea, on two steep hills that are connected by a bridge, has a magnificent prospect over fruitful fields in every direction, and is reputed the best built town in Sicily, having wide, well-paved streets. A stone stairway with 155 steps dating from 1506 leads from the spacious market-place up to the castle. The chief manufactures are those of terra-cotta figures, particularly of Sicilians and Calabrians in national costumes. Mosaics and vases, disclosed by excavating, point to an ancient town of unknown origin. Population (commune), in 1881, 32,000; in 1901, 44,879.

CALTANISSETTA, kăl'tä-nê-sĕt'tä Ar. (*Kalat-al-Nisa*, fortress of Nisa; Nisa was a Sicanian town). An episcopal city in the centre of Sicily, capital of the Province of Caltanissetta, situated on a hill 1930 feet above the sea, near the Salso, about 80 miles west of Catania, and southeast of Palermo (Map: Italy, J 10). The town has a castle, a cathedral with paintings of the later Sicilian school, public gardens with a picturesque prospect over mountain and valley, a seminary and a gymnasium, a school of technology and a school of mines, and a theatre. Two miles to the east is a beautiful Norman monastery erected in 1153 by Roger II., and 2 miles farther are a mud volcano resembling the Maccaluba (q.v., under ARAGONA) and an oil-well. The country has rich sulphur-mines, mineral springs, a lake full of fish, fields that fatten cattle and produce grain in abundance, and woods that contain much game. Population, in 1881 (commune), 30,000; in 1901, 43,300.

CAL'THA. See MARSH-MARIGOLD.

CALTON (kal'ton) **HILL.** An elevation in the northeastern part of Edinburgh, overlooking the Forth. Three monuments surmount it, one in memory of Dugald Stewart, another in memory of Nelson, and a third in celebration of the battle of Waterloo.

CALUM'BA, or **COLOM'BA** (Neo-Lat., probably from Mozambique *Kalumb;* according to some, the name is derived from Colombo, in Ceylon). The root of *Jateorrhiza palmata*, a herbaceous plant of the natural order Menispermaceæ. The calumba now chiefly in use is produced in Mozambique. The flowers of the plant have 12 sepals and petals in all, similar in appearance, and disposed in four rows. The male and female flowers are on separate plants. The leaves are nearly circular, with five to seven lobes, on long hairy footstalks, and solitary axillary racemes of small green flowers, the racemes of the male plants branching. The fruit is a drupe, or one-seeded berry-like fruit, about the size of a hazelnut, densely clothed with long hairs. The stem is annual and twining; the root perennial, consisting of clustered, spindle-shaped, fleshy tubers, with a brown warty epidermis, internally deep-yellow, with a very bitter taste, and a faint aromatic odor. Its bitterness is ascribed to a somewhat narcotic principle called calumbine, and to berberine, an alkaloid originally discovered in the barberry. Calumba is regarded as one of the most useful stomachic tonics. As it contains no tannin, it may be taken with preparations of iron. It is well borne by the stomach, and is sometimes given to allay vomiting. It has been found useful in diarrhœa and dysentery. It is administered in the form of powder, fluid extract, or tincture. The very poisonous seed known by the name of Cocculus Indicus (q.v.) belongs to a plant of a different but allied genus. The root of *Frasera Walteri* is sometimes fraudulently substituted for calumba, and has been called American calumba-root. It does not agree with calumba in its properties, but besides its very different appearance, it may be distinguished by its undergoing no such change of color,

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when touched with tincture of iodine, as in true calumba-root is produced by the presence of starch. See FRASERA.

CAL'UMET. A village in Michigan. See LAURIUM.

CALUMET (Fr., Late Lat. *calamellus*, dim. of Lat. *calamus*, reed). The popular name for the Indian ceremonial pipe. The Indians had pipes of various shapes and sizes, made of clay, stone, or bone, but the ceremonial pipe was usually of large size, in the East and Southeast of white stone, and in the West of the red catlinite from the noted pipestone-quarry in Minnesota.

CALUMET.

The stem was made long, of wood or reed ornamented with feathers and porcupine quill-work. In the East the white pipe was sometimes made with from four to seven stem-holes around the bowl, so that as many persons might smoke at the same time. Native tobacco, mixed with willow-bark or sumac-leaves, was used. Although frequently referred to as the 'peace pipe,' the ceremonial pipe was in fact used in the ratification of all solemn engagements, both of war and of peace.

CALUMPIT, kä'lōōm-pēt'. A town of Luzon, Philippines, in the Province of Bulacan. It is situated on the River Pampanga and is connected by rail with Manila. Population, in 1898, 15,000.

CALVADOS, kăl'vä'dōs' (from Calvados, corruption of *Salvador*, the name of a vessel of the Great Armada, which was wrecked here). A northern maritime department of France, bounded north by the English Channel, and east and west and south by the departments of Eure, Manche, and Orne (Map: France, F 2). It is the most historical section of the old Province of Normandy. The principal rivers are the Orne, Dromme, and Vire. The coast is partly formed by bold ridges, cliffs, and reefs. The soil of the department is generally fertile, supplying rich pasturage for cattle, sheep, and horses, which, with swine, constitute the principal wealth of Calvados. The climate is healthful, though changeable. Iron, marble, slate, and coal are found. Area, 2132 square miles. Population, in 1896, 414,669; in 1901, 407,639. Capital, Caen.

CALVAERT, käl'värt, or **CALUWAERT,** DIONYSIUS (c.1540-1619). A Flemish historical and landscape painter (called in Italy DIONISIO FIAMMINGO, 'the Fleming'). He was born in Antwerp, and was registered as an art pupil there in 1556; but he soon went to Italy and studied under Prospero Fontana, and later under Sabbatini, assisting the latter in the Vatican. About 1574 he opened a school in Bologna, and had among his students the celebrated Domenichino, Guido Reni, and Albani. Many excellent pictures by him are still preserved in Bologna, where he died.

CALVARY. In Roman Catholic countries, a representation of the various scenes of the passion and crucifixion of our Lord, either in a chapel, or external to the church, as at Saint Jacques in Antwerp. It consists of three crosses with the figures of Christ and the thieves, usually as large as life, surrounded by a number of figures, representing the various personages who took part in the crucifixion. At Aix-la-Chapelle, the calvary is a church on the top of a hill, surrounded by twelve sculptured stones, each marking an event which took place on the journey of the Saviour to Mount Calvary. The approach to the calvary is called the *Via Dolorosa*, each of the stones marking what is called a station (see STATIONS), at which the pious say a prayer in passing.

CALVARY. An oratorio brought out at the Norwich festival in England in 1839. It was a translation of *Des Heilands letzte Stunden* (Cassel, 1835) by Spohr, who personally conducted the production.

CALVÉ, käl'vä', EMMA, stage name of EMMA DE ROQUER (1864—). A French dramatic soprano. She was born in Madrid of a Spanish father and a French mother, and was brought up in a convent school in the Department of Aveyron, southern France. She studied under Rosine Laborde, and made her début in *Faust*, at the La Monnaie, Brussels (1882). Though praised, she showed no trace of her now admired fiery temperament. She overexerted her voice, and, on Gevaert's advice, went to Marchesi, reappearing (in 1884) in Dubois's *Aben Hamet* at the Théâtre des Italiens, then directed by Maurel. Since then she has sung at the Opéra Comique, at the Grand Opera, in England, Italy, Spain, Russia, and the United States, making her début in New York on November 29, 1893. She has sung in David's *Lalla Rookh*, *Nozze di Figaro* (Countess and Cherubino), *Magic Flute* (Pamina), Widor's *Maître Ambrose*, *Pêcheurs de Perles*, *Carmen*, *Hamlet*, *Cavalleria Rusticana*, *Faust*, *Mefistofele*, *Pagliacci*, *L'Amico Fritz*. Besides, she created the leading parts in Joncières's *Chevalier Jean* (1885); Samara's *Flora Mirabilis* (1886); De Lara's *Messaline* (1900); Massenet's *Navarraise* (1895); and *Sapho* (1897), the last two written especially for her. She was ready to sing Elsa in French, when the Opéra Comique burned down (1887).

Calvé's voice is a rich soprano sfogato of 2½ octaves from *g* below the staff to a high c, perfectly even throughout, with a contralto-like low register. Her extraordinary dramatic powers have gained for her the title of the 'singing Duse.' Her dazzling success as Carmen and Santuzza has led many to believe that she is mediocre as a singer pure and simple, with a small répertoire; but her technical virtuosity in Ophelia alone would place her among the greatest singers the world has known.

CALVERLEY, käl'vĕr-lĭ. The principal character in the pseudo-Shakespearian *Yorkshire Tragedy*. He is a dissolute fellow impoverished by gaming, whose maltreatment of his wife and

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children brings about the catastrophe of the play.

CALVERLEY, Charles Stuart (1831-84). An English humorist, born at Martley, Worcestershire. His father was the Rev. Henry Blayds, a name adopted near the first of the century, but in 1852 again changed to the ancestral Calverley. He was educated at Balliol College, Oxford, and at Christ's College, Cambridge, of which, after a brilliant career, he was appointed fellow (1858). At this time he was famous among his friends for many parodies and an examination paper on *Pickwick*. His publications are *Verses and Translations* (1862); *Translations into English and Latin* (1866); *Theocritus Translated into English Verse* (1869); and *Fly Leaves* (1872). Calverley holds a high place among writers of light and humorous verse, and his Latin renderings are exceedingly felicitous. After years of ill health, he died February 17, 1884. Consult Sendall, *Literary Remains*, with memoir (London, 1885).

CAL'VERT, George, and Cecil. See Baltimore, Barons of.

CALVERT, George Henry (1803-89). An American journalist and author, born in Baltimore, Md. He graduated at Harvard in 1823, studied in Göttingen, and, on his return from Germany, was editor of the *Baltimore American* for a number of years. In 1843 he removed to Newport, R. I., of which city he was elected mayor in 1853. He published a number of works in both prose and verse, including dramas, translations, and critical essays. Among them were: *Illustrations of Phrenology* (1823), the first treatise on the subject issued in this country; *Scenes and Thoughts in Europe* (1846-52); *An Introduction to the Social Sciences* (1856); *The Gentleman* (1863); *Goethe: His Life and Work* (1872); and *Three Score, and Other Poems* (1883).

CALVERT, Sir Harry (c.1763-1826). An English general. He was born at Hampton Court, and was educated at Harrow. In 1778 he was appointed second lieutenant of the Royal Welsh Fusiliers, and was soon ordered to America, where he participated in the siege of Charleston and in the campaign of Cornwallis which ended with the surrender at Yorktown. As adjutant of the Duke of York, he participated in the war with France which began in 1793. He became lieutenant-general in 1810, baronet in 1818, and general in 1821. His letters and memoranda were published by his son under the title, *Journals and Correspondence of Sir Harry Calvert, Bart.* (London, 1853).

CALVERT, Leonard (c.1582-47). The first Colonial Governor of Maryland. He was the brother of Cecil Calvert, the second Lord Baltimore, and by him was placed in charge, as Governor, of the small company of 200 men, who, in 1634, settled in Maryland under the charter secured from Charles I. by George Calvert, first Lord Baltimore. He continued to act as Governor until his death, though in 1643-44 he visited England to consult with his brother about affairs in the Colony. Perhaps the most noteworthy event during his term as Governor was his contest with William Claiborne (q.v.), who had settled on Kent Island before 1634, and denied the jurisdiction of the Maryland authorities. Claiborne was driven out in 1635, but in 1644 succeeded in expelling Calvert, who, however, again defeated him in 1646.

CALVES' HEAD CLUB. An association whose purpose was to ridicule the memory of Charles I. Its history is very obscure. According to the *Secret History of the Calves' Head Club* (2d ed., 1703), probably written by the notorious Ned Ward, it was originated by John Milton, and its meetings were given over to unseemly orgies in contempt of the Stuarts; but this book is absolutely worthless. Apparently there was no fixed place of assembly. The principal gathering is said to have taken place each year on January 30, the anniversary of the King's execution. It is highly improbable that the organization long survived the Restoration. If so, its proceedings must have been entirely secret. In 1735 a meeting of some young men calling themselves the Calves' Head Club was held at a tavern in Suffolk Street, London. An accident gave rise to a riot. As usually explained, the disturbance was caused by scandalous toasts offered within hearing of the crowd; but this is denied by Lord Middlesex, who was present. The affair has recently been pronounced a hoax, having no connection with the original association, which had doubtless long since ceased to exist. Consult: Timbs, *Clubs and Club Life in London*, new ed. (London, 1898). Compare Wilson, *Memoirs of the Life and Times of Daniel De Foe* (London, 1830); Spence, *Anecdotes*, 2d ed. (London, 1858); Walford, *Old and New London* (London, n. d.); and *Harleian Miscellany*, Vol. XII. (London, 1811).

CALVI, käl'vê. A fortified seaport of Corsica (belonging to France), situated on a peninsula in the Gulf of Calvi, about 38 miles west-southwest of Bastia. It has an old cathedral and good harbor, and carries on some trade in fish and southern fruit (Map: France, P 8). Calvi was captured by the English in 1794, after a siege of fifty-one days. Population, in 1896, 2132.

CAL'VILLE, *Fr. pron.* käl'vêl' (Fr., from Lat. *calvus*, bald, smooth surface). A kind of apple, of which there are numerous sub-varieties. The Calvilles diminish in thickness from the middle toward the calyx, where they form a point; they have regular ribs and a large open seed-chamber; also a pleasant smell, and are oily to the touch. They are never altogether streaked; they have a fine loose flesh, with a flavor somewhat resembling that of the raspberry or strawberry. The white winter Calville is in high repute, both as a culinary and dessert apple; it is very extensively cultivated on the Continent of Europe. This class of apples was early introduced in America, but is not now listed in the catalogues.

CAL'VIN (in its French form *Cauvin*, or *Caulvin*), John (1509-64). One of the most eminent of the Reformers of the Sixteenth Century. He was born at Noyon, in Picardy, France, July 10, 1509. His father, Gérard Cauvin, was procureur-fiscal of the district of Noyon, and secretary of the diocese. His mother was Jeanne Lefranc. He was one of six children—four sons and two daughters. All the three sons who survived were bred ecclesiastics; and the Reformer himself, on May 29, 1521, while still only 12 years of age, was appointed to receive part of the revenue of a chapel in the

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cathedral church of Noyon. This he held as a means of support during the period of his education, and even for some short time after he had entered upon his reforming career. Calvin was educated in circumstances of ease, and even of affluence. The noble family of Montmor, in the neighborhood, invited him to share in the studies of their children; he was in some measure adopted by them, and when the family went to Paris, in his fourteenth year (1523), he accompanied them, and participated in the benefits of the higher instruction which was there attainable. He was entered as a pupil in the Collège de la Marche, under the regency of Mathurin Cordier, better remembered, perhaps, by his Latin name of Corderius. It was under this distinguished master that Calvin laid the foundation of his own wonderful mastery of the Latin language. Not long afterward he left him for the strictly ecclesiastical college of Montaigu, in the same university. During this early period he was distinguished by the great activity of his mental powers and the grave severity of his manners. His companions, it is said, surnamed him the 'Accusative.'

Probably at first his father intended that he should study theology, and in 1527 got him the curacy of Saint Martin de Martheville (near Vermans, Aisne) in addition to that of the chapel, which, however, Calvin resigned in 1529, in favor of his younger brother, and the same year exchanged the curacy for another, that of Pont l'Evêque, where his father had been born. But in 1528 his father changed his mind and determined that he should become a lawyer. He therefore sent him, with the view to his studying law, to the University of Orleans, then adorned by Pierre de l'Etoile, one of the most famous jurists of his day, and afterwards president of the Parliament of Paris. At Orleans he continued the same life of rigorous temperance and earnest studiousness for which he was already noted. Beza says that, after supping moderately, he would spend half the night in study, and devote the morning to meditation on what he had acquired. His undue habits of study seem to have laid thus early the foundation of the ill health which marked his later years. It was while a law-student in Orleans that he became acquainted with the Scriptures and received his first impulse to the theological studies which have made his name so distinguished. A relative of his, Pierre Robert Olivetan, was there engaged in a translation of the Scriptures; and this had the effect of attracting Calvin's attention, and awakening within him the religious instinct which was soon to prove the master-principle of his life. We cannot say as yet that his traditionary opinions were unsettled or that he had embraced with any decision the Protestant opinions that were spreading everywhere; but the seeds of the new faith were now beyond doubt sown in his heart, and from this time, although he still continued for a while longer to pursue his legal studies, his main interests appear to have been religious and theological. From Orleans he went to Bourges (1530), where he acquired a knowledge of Greek, under the tuition of a learned German, Melchior Wolmar, whose spiritual instructions influenced him. He began here to preach the reformed doctrines, and passed into the ranks of Protestantism, under the slow but sure growth of his new convictions, rather than under the agitation of any violent feeling. Here, as everywhere, his life presents a marked contrast to that of Luther.

The death of his father in 1531 left him free to follow his inclinations, which were for theological and classical studies. He proceeded to Paris, which at this date had become a centre of the 'new learning,' under the teaching of Lefevre and Farel, and the influence of the Queen of Navarre, sister of Francis I., and there he published, at his own expense, in 1532, his first book, a commentary on Seneca's essay *On Mercy*. But reformed notions in theology were in the air. The Sorbonne itself had not escaped the infection. There was a growing religious excitement in the university, in the Court, and even among the bishops. This, however, was not to last. The King was soon stirred up to take active measures to quell this rising spirit. Calvin was himself converted to the new views, and when his friend, Nicholas Cop, had been elected to the rectorship of the University of Paris, he wrote the inaugural oration (1533) for him and took for his theme the necessity of there being a reformation of the Church and of theology on the basis of the New Testament. The result was that Calvin and Cop were obliged to flee for their lives. The story is that Calvin narrowly escaped, having descended from his window by means of his sheets, and fled, under the guise of a vine-dresser, a friend of his, in whose clothes he concealed himself. After this he repaired for a short time to his native place, resigned the preferment he held in the Roman Catholic Church, and for nearly three years led a wandering life, sheltered in various places. We find him at Saintonge; at Nérac, the residence of the Queen of Navarre; at Angoulême, with his friend, Louis Tillet; then for a brief period, while in Paris again, strangely enough expecting a meeting with Servetus, who had expressed a desire to see and confer with him. Persecution against the Protestants at this time raged so hotly that Calvin was no longer safe in France; and he betook himself to Basel, where he prepared the first edition of the *Institutes of the Christian Religion* (1536), with the famous preface addressed to Francis I. The concentrated vigor of this address, its intensity of feeling, rising to indignant remonstrance, and at times to a pathetic and powerful eloquence, make it one of the most memorable documents in connection with the Reformation. It is throughout a noble defense of the righteous character of the reformed doctrines, and their support alike in Scripture and in history. The energetic decisiveness and moral zeal of the future teacher and legislator of Geneva speak in every page of it. After completing this great service to the cause of Protestantism, he went for a short time to Italy, to visit Renée, the Duchess of Ferrara. Finally, he revisited his native town, sold the paternal estate, which had devolved to him on the death of his eldest brother, and, bidding it adieu, set out, in company with his younger brother and sister, on his way to Strassburg. The direct road being rendered dangerous by the armies of Charles V., which had penetrated into France, he sought a circuitous route through Savoy and Geneva.

The result of this journey was memorable for the cause of the Reformation. Arrived in Geneva

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(July, 1536), he met there his friend, Louis du Tillet, who communicated the fact of his arrival to Farel, then in the very midst of his struggle to promote the Reformation in the city and neighborhood. Farel hastened to see him and urged upon him the duty of remaining where he was, and undertaking his share of the work of God, under the burden of which he himself was likely to sink. Calvin did not at first respond to the call. He was given, he himself says, to his "own thoughts and private studies." He wished to devote himself to the service of the reformed churches generally rather than to the care of any particular church. A life of intellectual and theological labor was that which at that time was most congenial to him. By some strange insight, however, Farel discerned the higher fitness of the young stranger who stood before him, and he ventured, in the spirit of that daring enthusiasm which characterized him, to lay the curse of God upon him and his studies if he refused his aid to the Church of Geneva in her time of need. This seemed to Calvin a divine menace. "It was," he said, "as if God had seized me by His awful hand from heaven." He yielded and joined eagerly with Farel in the work of reformation.

Such was the beginning of Calvin's great career in Geneva. Having abandoned his intention of pursuing his journey, he soon infused an energy into his task which crowned the struggling efforts of Farel with success. The hierarchical authority was already overturned before his arrival; the citizens had asserted their independence as against the Duke of Savoy, whose alliance with the corrupt episcopate, which was the direct governing influence in the place, had called forth the patriotic as well as the religious feelings of the people. The magistrates and people eagerly joined with the reformers in the first heat of their freedom and zeal. A Protestant confession of faith was drawn up, approved of by the Council of Two Hundred, the largest governing board of the city, and then proclaimed in the cathedral church of St. Peter's as binding upon the whole body of the citizens. Great and marvelous changes were wrought in a short time upon the manners of the people; where license and frivolity had reigned, a strict moral severity began to characterize the whole aspect of society. The change, however, was too sudden and the strain was too extreme. A spirit of rebellion against the rule of Calvin and Farel broke forth. They, however, refused to yield to the wishes of a party animated by a more easy and liberal spirit than themselves (known in the history of Geneva under the nickname of Libertines); and the consequence was that they were both expelled from the city after less than two years' residence (April 23, 1538).

Calvin turned to Strassburg, where he had meant to go when arrested in his course in Geneva. Here he settled, and devoted himself to theological study, and especially to his critical labors on the New Testament. Here, also, in October, 1539, he married a member of his congregation, Idelette de Bure, widow of Jean Stordem, of Liège, an Anabaptist, whom he had converted, and who had died in February, 1538. The marriage appears to have proved a happy one. His wife bore him one child, a son, who, being born prematurely, died shortly after his birth. (See his letters to Viret of July and August 19, 1542.) She herself died in April, 1549.

The Genevans found, after a short time, that they could not well do without Calvin. His rule might be rigid; but an authority even such as his, which might prove galling in its severity, was better than no settled authority at all; and the Libertine party seemed to have been unable to construct any efficient and beneficent form of government. Accordingly, the citizens invited Calvin to return; and after some delay on his part, in order to test the spirit in which they were acting, he acceded to their invitation, and on September 13, 1541, after three years' absence, once more made his entry into Geneva.

Now, at last, he succeeded in establishing his plan of Church government, in all its forms and details. By his college of pastors and doctors, and his consistorial court of discipline, he founded a theocracy, with himself at the head of it, which aimed virtually to direct all the affairs of the city, and to control and modify both the social and individual actions of the citizens. Not without a struggle, it may be supposed, did he succeed in his great autocratic scheme. The Libertines, although dishonored by their ineffectual attempts to maintain order in the city, and uphold its rights and dignity, still remained a strong party, which was even augmented after Calvin's return by such men as Amy Perrin, who had strongly concurred in the invitation to Calvin, but who were afterwards alienated from him by the arbitrary way in which he pursued his designs, no less than by their own schemes of ambition. The struggle with these opponents lasted with varying fortunes for no less a period than fifteen years, and was only terminated in 1555, after a somewhat rediculous *émeute* in the streets. Amy Perrin and others, driven from the city, were executed in effigy; and the reformer's authority from this date strengthened into an absolute supremacy.

During the period of this long struggle with the Libertines, Calvin had many other disputes, in which he displayed equal zeal. The most remarkable of these were his controversies with Sebastian Castellio, Jerome Bolsec, and, above all, Michael Servetus.

Calvin had become acquainted with Castellio in Strassburg (1540). They entertained at first a warm friendship for each other, and Calvin showed great zeal in assisting Castellio, whose poverty and learning had attracted his sympathy. When he returned to Geneva, he invited Castellio to join him there, and procured for him the rectorship in the Latin school of the city. There was little similarity, however, in the characters of the two men, and the diversity of their tastes and views soon became apparent. The learning of Castellio was intensely humanistic; a classical spirit and a somewhat arbitrary opinionativeness molded all his studies. As soon as he began to apply himself to theology, he came into conflict with Calvin. In a letter to Viret, September 11, we find Calvin speaking of "the freaks of our friend Sebastian, which may both raise your bile and your laughter at the same time." These freaks relate to Castellio's notions of scriptural translation, and his refusal of Calvin's offer to revise the version which he had made of certain parts of Scripture. Then, two years later, when Castellio desired to en-

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ter the ministry, Calvin dissuaded the council from accepting him, on account of some peculiar opinions which he held. These were certain rationalistic views as to the authenticity and character of the Song of Solomon, the descent of Christ into hell, and also about election. After this, Castellio left Geneva for a while, but soon returning, he attacked the views of Calvin openly (see Calvin's letter to Farel, May 30, 1544), and was forced to leave the city. The two old friends, now declared enemies, did not spare each other henceforth. Castellio died in Basel December 29, 1563. (For his biography, consult F. Buisson, Paris, 1892.) The fate of Servetus drew forth an anonymous publication, attacking with keen logic and covert and ingenious sarcasm the Genevan doctrines. This publication was attributed by both Calvin and Beza to Castellio, and they replied to him in no measured terms, stigmatizing him as a "deceiver and vessel of Satan." One fact really disgraceful to Calvin in the controversy ought not to be passed over. Sunk in great poverty, Castellio was obliged, in his old age, to gather sticks on the banks of the Rhine at Basel, as a means of support. Calvin did not hesitate to accuse him of stealing the sticks. Such polemical truculence may well make us turn away in disgust and indignation.

The controversy with Bolsec belongs to a later period. Jerome Bolsec was originally a Carmelite monk, but had thrown aside the habit, and betaken himself to the practice of medicine in Geneva. He was led to attack Calvin's doctrine of predestination. As soon as Calvin heard of this, he gave him to understand that he was not at liberty to question the Genevan doctrine. He and others of the clergy dealt with him; but after repeated disputations, Bolsec was found incorrigible, and was sentenced to banishment from the city (December 25, 1551). Cast out of the theocratic community, he ultimately rejoined the Roman Catholic Church, and meanly revenged himself upon Calvin by writing his life in a spirit of detraction and slander (Lyons, 1577).

Of all these contests, however, the most memorable is that with Servetus. A melancholy interest surrounds the name of this great heretic, which the criminal tragedy of his death keeps ever fresh and vivid in the minds of all who hate intolerance, and who love truth more than dogmatism. The character of Servetus himself has little to do with this interest. He seems to have been a vain, restless, and enthusiastic dreamer, rather than a calm and patient inquirer. In his very dreams, however, and the vague audacities of his speculation, there is a kind of simplicity and unconscious earnestness that wins sympathy. He had entered into various relations with Calvin even from the time of his early residence in Paris; particularly, he had sent him various documents containing the views fully developed, in his work subsequently published under the title of *Restitutio Christianismi* (1553). Calvin never concealed his abhorrence of these views; and in a letter to Farel on February 13, 1546, he says: "Servetus lately wrote to me. . . . He takes it upon him to come hither, if it be agreeable to me, but I am unwilling to pledge my word for his safety, for if he shall come, I shall never permit him to depart alive, provided my authority be of any avail." The history of his seizure and condemnation at Vienne by the Catholic authorities, and especially of Calvin's share in the correspondence which led to his seizure, is very complicated and obscure. It has been maintained that Calvin was the instigator, through a creature of his own, of the name of Trie, of the whole transaction; it is certain that he forwarded to the authorities, through Trie, private documents which Servetus had intrusted to him, with a view to the heretic's identification, and as materials for his condemnation. Servetus was sentenced to be burned, but effected his escape, and, after several months' wandering, he was found in Geneva. It was his intention to proceed to Italy, where he hoped his opinions might meet with some degree of toleration, and he arrived at Geneva on his way. This is the explanation of an event otherwise unaccountable. Having ventured to attend church, according to the common account, he was recognized, apprehended, and conveyed to prison by Calvin's order, just as he was about to leave the city. The particulars of his trial are full of interest, but too detailed to be given here. It lasted, with various interruptions, for two months. He attacked Calvin with the most foul epithets, and Calvin retorted with a virulence and foulness quite equal to his own. At length, on October 26, 1553, sentence was passed upon Servetus, condemning him to death by fire. Calvin used his influence to have the mode of death altered to decapitation, but without success. On the very next morning the sentence was put into execution. On an eminence, at some distance from the city, Servetus was fastened to a stake, surrounded by heaps of oak-wood and leaves, with his condemned book and the MS. he had sent to Calvin attached to his girdle; and, amid his agonizing cries, the fire was kindled, and the wretched man expiated his heresy in the flames. Whatever apologies may be urged for this memorable crime, it must remain a mournful and scandalous blot on the history of the Reformation. The disgrace of it has particularly attached to Calvin, and with much justice, from the special and unhappy relation which he bore to the whole transaction; but many of the other reformers are no less implicated in it. The wise Bullinger defended it, and even the gentle Melanchthon could see only cause for gratitude in the hideous tragedy. See SERVETUS.

After the execution of Servetus, and the expulsion of the Libertines, two years later, Calvin's power in Geneva was firmly established, and he used it vigorously and beneficently for the defense of Protestantism throughout Europe. By the mediation of Beza, he made his influence felt in France in the great struggle there going on between the hierarchical party, with the Guises at its head, and the Protestants, led by Condé and Coligny. In 1561 his energies began to fail. He had long been suffering from bad health, but his strength of will and buoyancy of intellect sustained him amid all his bodily weakness. In the year now mentioned, his bad health greatly increased, and although he survived for more than two years, he never regained his vigor. He died in Geneva on May 27, 1564.

Very different estimates, it may be imagined, have been formed of Calvin's character, according to the point of view from which it is con-

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templated. None, however, can dispute his intellectual greatness, or the powerful services which he rendered to the cause of Protestantism. Stern in spirit and unyielding in will, he is never selfish or petty in his motives. Nowhere amiable, he is everywhere strong. Arbitrary and cruel when it suits him, he is yet heroic in his aims, and beneficent in the scope of his ambition. Earnest from the first, looking upon life as a serious reality, his moral purpose is always clear and definite—to live a life of duty, to shape circumstances to such divine ends as he apprehended, and, in whatever sphere he might be placed, to work out the glory of God.

He rendered a double service to Protestantism, which, apart from anything else, would have made his name illustrious; he systematized its doctrine and he organized its ecclesiastical discipline. He was at once the great theologian of the Reformation, and the founder of a new Church polity, which did more than all other influences together to consolidate the scattered forces of the Reformation and give them an enduring strength. As a religious teacher, as a social legislator, and as a writer, especially of the French language, then in process of formation, his fame is second to none in his age, and must always conspicuously adorn the history of civilization. Among Calvin's most important works are: *Christianæ Religionis Institutio* (1536); *De Necessitate Reformandæ Ecclesiæ* (1544); *Commentaires sur la concordance ou harmonie des Evangélistes* (1561); *In Novum Testamentum Commentarii; In Libros Psalmorum Commentarii; In Librum Geneseos Commentarii.* The first edition of Calvin's whole works is that of Amsterdam, 1671, in 9 vols., fol., but this has been superseded by the definitive and critical edition begun by J. W. Baum, E. Cunitz, and E. Reuss, and finished by Lobstein and Erichson (59 vols., Brunswick and Berlin, 1863-1900). Consult A. Erichson, *Bibliographica Calviniana* (Berlin, 1900). By the Calvin Translation Society, in Edinburgh, his works have been collected, translated into English, and issued in 51 vols., 1843-55. For his biography, consult: T. de Beza (Geneva, 1564; n. e. Paris, 1869), the original life, written a few weeks after Calvin's death; J. Bolsec (Lyons, 1577; n. e. 1875); and J. M. V. Audin (Paris, 1841; 6th ed. 1873), written from the Roman Catholic standpoint; P. Henry (3 vols., Hamburg, 1835-44), English translation abridged and altered by Stebbing (London, 1851); T. H. Dyer (London, 1850); F. Bungener (Paris, 1863, English translation Edinburgh, 1863); E. Staehelin (Elberfeld, 1863); A. Pierson (Amsterdam, 1883-91)—all of which are written from the Protestant point of view. A very valuable and impartial book from a Roman Catholic is, F. W. Kampschulte, *Johann Calvin, seine Kirche und sein Staat in Genf* (Leipzig, 1869-99). An exhaustive work is that of E. Doumergue, of which the first volume appeared in Lausanne in 1899. It contains many illustrations from original drawings, facsimiles, etc., and is the work of a lifetime. Consult also the biography of Calvin by Philip Schaff in his *History of the Christian Church* (New York, 1892), Vol. VII., pp. 257-844.

CALVINISM. The system of thought deriving its name from its greatest representative, John Calvin (1509-64). It has its starting-point in the conception of the sovereignty of God. This is not merely His sole causality in the physical universe, but His priority, in particular, in the whole realm of the religious life. The fundamental element of the system was expressed by Schleiermacher, *Die christliche Glaube* (Sec. 32 ff.), and after him by the learned historian of the reformed theology, Schweizer, *Die Glaubenslehre der evangelisch-reformirten Kirche* (Sec. 23), as the feeling of the entire dependence of all that is and takes place upon God. This predestination, which has sometimes been seized upon as the distinguishing feature of the system, is a consequence of the true principle rather than that principle itself.

The historical origin of Calvinism goes far back of Calvin himself. It found its first prominent exponent in Augustine (q.v.), though its essential elements may be detected in the earliest history of the Church. It took its Augustinian form in consequence of the discussions of the Pelagian controversy (see PELAGIANISM), in which the point at issue was the originating source of conversion. Pelagius mantained that this was in the independent action of man, Augustine that it was in the prevenient grace of God, eliciting the human activity. From this germ developed the most distinctive features of Augustinianism, original sin, bondage of the will, and inability to be good, predestination, and the reference of all good to God alone. The tendency of the course of discussion in the Middle Ages was to weaken the Augustinian system, but it was restored by the Reformers, Luther, Zwingli, and Calvin. The latter incorporated it in his *Institutes* (final edition, 1559), which was the most perfect system of Christian doctrine that had ever been produced. From this work it went into the great Protestant confessions, the Heidelberg, French, Belgic, Synod of Dort (on occasion of the controversy with the Arminians, q.v.), and the remarkable series of English confessions, beginning with the *Articles of the Church of England* (first issued in 1552), embracing the Lambeth (1595) and the Irish (1615) articles, and concluding with the Westminster (1647). It was represented by a long series of divines, of whom Beza, Bullinger, Ames, Turretin, John Owen, Jonathan Edwards, and Charles Hodge (best recent statement of the system) may be mentioned. It is now the confessional theology of the Presbyterian and so-called 'Reformed' churches in all the Protestant nations. In New England, under the influence of Edwards and his pupils, there arose a school of 'consistent' Calvinists, who variously modified the details of the system, principally in consequence of a new psychology of the will and of virtue. But this has manifested its essential divergence from Calvinism by the further development through which it has gone.

The decisive element of the Calvinistic system is, then, its doctrine of God. With other Protestant systems, it is distinctly theistic and trinitarian. It lays emphasis upon the immutable nature of God, and upon His unchangeable attributes of justice and love, each equally sovereign. God's design in the creation of the world was the manifestation of His own glorious attributes, of which these are the chief. Accordingly, He forms in eternity the plan upon which he conducts both creation and the government

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of the created world. He "foreordains whatsoever cometh to pass." Two schools have arisen as to the order of the divine decrees: one, the 'Supralapsarian,' looking to the final result as the first thing contemplated in God's decree, and making their order, therefore, creation, election, and reprobation, the fall, redemption by Christ, and application of redemption by the Holy Spirit; the other, the 'Infralapsarian,' which seeks to avoid the impression gained from Supralapsarianism, that men are condemned before they are guilty, by making the order of decrees, creation, fall, election, redemption, etc. The latter has been the prevailing view among Calvinists, though many regard the difference as merely logical.

The decree of the fall is the decree that man shall sin; but Calvinists generally regard this as a permissive decree, and all understand that man sins in perfect freedom, and that sin is his own act, and not that of God. All the decrees equally preserve the freedom of man. This theological proposition is explained by various theories of the will and of the psychology of moral action. None of these can be regarded as essential to the system, which is independent of its psychological explanation. The first sin, the sin of Adam, did not affect him alone, but involved the race in sin and guilt. Every member of the race is so connected with its first member (whether by divine constitution, by a realistic identity, or by federal representation) that all sin in and with him and are justly condemned for that sin. Thus Adam's sin is said to be 'imputed' to his descendants. Imputation is either 'mediate,' that is because of original depravity, or 'immediate,' by which original depravity is the penal result of orginal guilt directly imputed. Original sin, which is prenatal forfeiture of the indwelling of the Holy Spirit, with consequent defect and disorder of soul, and inclination to evil, results in actual and individual sin. The consequence of all this is a total inability to be good and the absolute necessity of regenerating grace before any soul can repent and receive the divine forgiveness. Hence the electing grace of God cannot be conditioned upon the foreseen faith of the elect, because, apart from God's activity, and thus apart from His purpose to act in their behalf, or apart from election, they have no faith and can have none.

Grace is the favor of God shown to the undeserving. It is the execution of the decrees of God. God, in forming the decree of election, is sovereign; that is, the motive which leads Him to set apart a certain and fixed number of souls unto eternal salvation resides in Himself alone, and not in them. Grace is of three kinds: 'Common' grace is bestowed upon all men, tends to good, and results in the various natural virtues, such as kindliness, honesty. 'Prevenient,' 'effectual,' or 'irresistible' grace is that by which the soul is regenerated. It is sometimes said to be an activity beneath consciousness, or effected creatively, in the very nature of the soul. By it the will is moved to holy action, and repentance and faith are produced. 'Coöperative' grace works with the will thus turned to God, and is the case of what degree of actual holiness the Christian attains. Grace also includes the 'gift of perseverance,' which secures the perseverance and final salvation of the soul.

The Calvinistic doctrine of the Atonement depends upon the positions already rehearsed. It is an act of the infinite love of God finding a way whereby both His attributes of justice and mercy may be completely and consistently exercised in the salvation of men. It provides a substitute for the sinner who, because of his humanity, can represent man, and because of His divinity, can offer a sufficient sacrifice for men's sins. The God-man bears the penalty of the sins of men as a true penal substitute, thus satisfying justice, and works out a perfect righteousness for weak and imperfect men; and thus He provides for both the forgiveness and the justification of the believer.

The adherents of Calvinism claim for it a great and decisive influence for good upon the history of the world. As the religion of the French Huguenots, of the founders of the Dutch Republic, of Scotch Covenanters, and of English Puritans, it has its heroic period to point to, and its roll of martyrs second to none. Bancroft, the historian of the United States, himself not a Calvinist, refers modern republican liberty to the influence of the little Republic of Geneva, and to Calvinism. Its influence in promoting the independence of the United States was indisputably great. It has proved one of the chief forces in promoting the education of the common people, and in fostering higher education in the modern world. And its efforts in the department of foreign missions during the last century led and surpassed those of other schools of thought.

For the essential sources in the study of Calvinism, consult: Bright, *Select Anti-Pelagian Treatises of Saint Augustine* (London, 1880, for the Latin text, or Warfield's "Augustine's Anti-Pelagian Treatises," in *Nicene and Post-Nicene Fathers*, Vol. V. (New York, 1886-88); Calvin, *Institutio Christianæ Religionis*, edited by Tholuck (Berlin, 1846); English translation, *The Institutes of the Christian Religion* (Philadelphia). Best modern presentations: Charles Hodge; *Systematic Theology* (3 vols., New York, 1872); W. G. T. Shedd, *Dogmatic Theology* (3 vols., New York, 1888). Expositions, A. A. Hodge, *A Commentary on the Westminster Confession of Faith* (Philadelphia, 1869); A. Kuyper, "Calvinism," *The Stone Lectures* (New York, 1898). See ARMINIANISM.

CALVINISTIC METHODISTS. A body in Great Britain in three divisions: the Whitefield Connection, 1741; Lady Huntingdon Connection, 1748; and Welsh Methodists, 1750. See METHODISM; PRESBYTERIANS.

CALVINISTIC (or PARTICULAR) **BAPTISTS.** See BAPTISTS.

CALVO, käl'vô, CARLOS (1824-93). An Argentinian diplomat and writer on international law. He was born in Buenos Ayres and early entered upon a diplomatic career abroad. He was one of the founders of the Institut de Droit International, and later the Ambassador of the Argentine Republic to France. Among his principal works are the following: *Recueil complet des traités, conventions, etc., de l'Amérique latine* (11 vols., 1862-69); *Annales historiques de la révolution de l'Amérique latine*

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(5 vols., 1864-75); *Le droit international théorique et pratique* (4th ed., 1887-88); *Manuel de droit international public et privé* (3d ed., 1892).

CAL'VUS, GAIUS LICINIUS MACER (B.C. 82-47). A Roman poet and orator. In the latter capacity he is often praised by Cicero (*Brut.*, lxxxi., lxxxii., ss. 280-285; *Ep. ad Fam.* vii. 24; xv. 22). According to the ancients (Quint. x., s. 111; Catullus, 96; Propertius, ii. 19, 40; Ovid, *Am.*, iii. 9, 61); his poems were full of wit and grace, and were classed with those of Catullus. The latter addressed three of his odes (14, 50, 96) to Calvus.

CAL'YCAN'THUS (from Gk. *κάλυξ*, *kalyx*, cup + *ἄνθος*, *anthos*, flower, referring to the cups enclosing the pistils). A genus of Calycanthaceæ, an order of plants allied to Rosaceæ. Only about six species are known. They are shrubs with opposite entire leaves, and are natives of North America and Japan. An aromatic fragrance characterizes the order, and in the genus Calycanthus the bark and leaves possess it as well as the flowers. The bark of the Calycanthus has acquired the name of Carolina allspice, or American allspice. The flowers are of a chocolate or dull purple color. It is quite a favorite garden shrub, being commonly known as 'sweet-scented shrub.' The four American species are found wild along the Alleghanies, in Pennsylvania, Virginia, etc., except *Calycanthus occidentalis*, with brown flowers, which grows in California only.

CAL'YDON (Gk. Καλυδών, *Kalydōn*). An ancient city of Ætolia, 7½ miles from the Ionian Sea on the river Evenus. It was celebrated in Greek legend as the home of Meleager, Tydeus, and other heroes, but in historic times was of small importance. In B.C. 391 it was in possession of the Achæans, and was of strategic value in the war between Cæsar and Pompey. In B.C. 31 Augustus removed the inhabitants to Nicopolis, a city then founded to commemorate the victory of Actium. The site is generally believed to be at the Kastro of Kurtaga, on the river Phidharis, where are remains of walls and gates, as well as terraces and foundations. Consult Woodhouse, *Ætolia* (Oxford, 1897).

CALYDON. A great forest, supposed to have once existed in the north of England and mentioned in Arthurian romance. It may have corresponded with the thickly wooded district of the 'midlands,' which reached up into Yorkshire, and which contained the 'Sherwood' associated with the Robin Hood legends.

CAL'YDO'NIAN BOAR. According to a Greek myth, a certain Œneus, King of Calydon, in Ætolia, omitted a sacrifice to Artemis, whereupon the goddess, in her rage, sent into his fields a frightful boar, which committed great devastation. No one had the courage to hunt it except Meleager, the son of Œneus, who, calling to his help the bravest heroes of Greece—Theseus, Jason, Nestor, and others—pursued and slew the monster. This hunt is a favorite subject in Greek art, and appears not only on the vases and reliefs, but was also represented in the pediment of the Temple of Athena Alea at Tegea by the great sculptor Scopas, of whose work some fragments have been found, and are now in Athens. See MELEAGER.

CALYMMENE, kā-lĭm'ē-nē (Gk. *κεκαλυμμένη*, *kekalymmenē*, fem. perf. part. of *καλύπτειν*, *kalyptein*, to cover; refers to the thorax and shield). A genus of fossil trilobites characteristic of the Silurian system. It has a rather long body, of oval form, with a semicircular head-shield and a thorax of 13 segments. The tail-shield is lobed like the thorax, and is not clearly distinguishable from the latter. About 60 species of Calymmene have been described from the Silurian and Ordovician strata, and the largest have been found in the lower Devonian rocks. Calymmene blumenbachia and Calymmene senaria are prominent species.

CALYP'SO (Gk. Καλυψώ, *Kalypsō*). In Grecian legend, a nymph, dwelling alone on a remote island, who rescued the shipwrecked Odysseus, and kept him with her seven years, promising him immortality, but unable to make him cease his longing to return to Ithaca. She finally yielded to a command of Zeus and allowed him to depart on a raft of his own building. Calypso is a somewhat late addition to the Odysseus story, and is merely a name outside of the Homeric poem. Her sons by Odysseus are entirely without connection with the general story.

CALYP'TRA (Gk. *καλύπτρα*, *kalyptra*, from *καλύπτειν*, *kalyptein*, to conceal). A term commonly applied to the enlarged and ruptured archegonium (female organ) of the true mosses, which is carried up as a loose hood, capping the spore-case. Its application is often extended, however, to include any development of the archegonium which follows fertilization. See MUSCI.

CA'LYX (Lat., Gk. *κάλυξ*, *kalyx*, cup of a flower, from *καλύπτειν*, *kalyptein*, to cover). In flowers, the outer and sometimes the only set of floral leaves. The individual parts are called 'sepals,' and when these are not present the flower is said to be 'naked.' The sepals are usually green and leaf-like, and serve to protect the more delicate inner parts in the bud, but sometimes they are very much modified. See FLOWER.

CAM (Kelt., crooked), or GRANTA. A river which rises in Essex, England, and is known as the Granta until it joins with the Rhee, 3 miles above Cambridge, to which city it gives its name. After a northeasterly course of about 40 miles through Cambridgeshire, it joins the Ouse, 3½ miles above Ely. It is a favorite boating river, famous in connection with the boat-races of the students of Cambridge University.

CAM (dialectic form of Engl. *comb*; cf. Ger. *Kamm*, comb, *Kammrad*, cog-wheel). A revolving disk eccentrically mounted on a shaft and employed in mechanism to impart by its rotation a reciprocating motion to a rod or shaft. One of the common forms of cam is a heart-shaped wheel mounted on a shaft as shown at *A*. The operation of this form of cam may be indicated by the lever *B*, pivoted at the centre and carrying at one end a rod, *C*, and at the other end a wheel, *D*, which has a rolling bearing against the face or edge of the cam. As the cam rotates, the wheel, *D*, will be raised and lowered, and this movement will, through the medium of the lever, *B*, raise and lower the rod, *C*, so as, for example, to open and close a valve. Cams are made in a great variety of shapes. By cutting teeth on the edge of the cam, *A*, and

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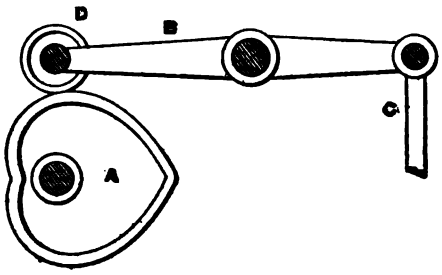
also on the edge of the wheel, *D*, and arranging the two so that their teeth mesh, we have what is called a 'cam gear-wheel' arrangement. A circular wheel, mounted concentrically on a



CAM.

shaft and having a lug or projection at intervals on its edge, is called a 'cam-wheel.' Cams and cam-wheels are extensively employed in mechanisms for all sorts of purposes.

CAM, kăn, Auguste Nicolas (1822—). A French sculptor, born in Paris. He was educated in the atelier of Rude, and until about 1865 confined himself almost entirely to the representation of small animals. Afterwards, however, he departed from this genre and preferably represented combats between beasts of prey. His best-known works are: "Linnets Defending Their Nest Against the Rat" (1846); "Frogs Demand a King" (1851); "Tiger in Conflict with a Crocodile" (1870); "Rhinoceros Attacked by Tigers" (1884, Garden of the Tuileries); "Eagle and Vulture Wrangling Over the Carcass of a Bear" (1890).

CAM, kăn′, or **CÃO**, koun, Diogo. A Portuguese navigator of the Fifteenth Century, who continued the African discoveries inaugurated by Prince Henry. In a voyage made in 1484-85 he sailed along the west coast of Africa as far as the Congo. He had sufficient influence with the King of Congo to induce that monarch to permit the establishment of Christianity in his dominion.

CAMACHO, kä-mä′chô. The unhappy bridegroom of Quiteria in Cervantes's *Don Quixote*. He is cozened out of his wife, after he has prepared a great feast in her honor.

CAMAJUANI, kä′mä-hwä′nē. A city of Cuba, in the Province of Santa Clara, about 20 miles from the northern coast of the island. It is connected by rail with Havana, Cardenas, and the coast. Population, in 1899, 5082 (municipal district, 14,495).

CAMAL′DOLITES. A religious order, founded in the vale of Camaldoli (Neo-Lat. *Campus Madoli*), near Arezzo, in the Apennines, in 1012, by Saint Romuald (c.950-1027), a Benedictine monk, and a member of the family of the dukes of Ravenna. It soon spread through Italy. The brethren, who wear white garments, are, and have always been, characterized by the excessive rigidity of their monastic rule, yet on festival days they are allowed to eat fish and drink wine. The order has greatly declined, until now it has only six monasteries and about 200 members. Its greatest ornaments have been Gratian, the great canonical jurist of the Twelfth Century, and Pope Gregory XVI. (1831-46). There was an order of nuns of the name, but it has now only convents in Rome and Florence. The former convent of Camaldoli, near Naples, is famous for the unsurpassed view of the Bay of Naples which its garden affords.

CAMALIG, kä′mä-lēg′. An inland town of the Philippines, in the Province of Albay, Luzon. It lies 7 miles west of Albay, the capital, in a plain near the source of the Juaya River. Population, in 1898, 14,868.

CAMARA Y LIBERMOORE, kä-mä′rä ē lē′bär-mō-ō′rā, Manuel de la (1836—). A Spanish naval officer. He was born in Malaga, graduated at the naval academy in San Fernando, and served in the Mexican campaign as staff officer of Admiral François Jurien de la Gravière, and later acted successively as lieutenant on the *Vencedora* and sailing master on the *Villa de Madrid*. He subsequently figured prominently in the campaign against Peru and Chile, and in the struggle with Cuba (1868-78), and, with the rank of captain, commanded a squadron in the Philippines. He was then appointed chief of the naval commission to the United States and London, and as vice-admiral commanded the squadron dispatched to the Philippines during the progress of the Spanish-American War. This squadron, consisting of the *Pelayo*, *Cárlos V.*, *Audaz*, *Osado*, *Prosérpina*, *Rápido*, *Patriota*, *Buenos Aires*, *Isla de Panay*, *Colón*, *Cavadonga*, and *San Francisco*, sailed from Cadiz, with 3000 soldiers, on June 16, 1898, and had already passed the Suez Canal en route for the Philippines, when the news of the destruction of Cervera's fleet compelled it to return.

CAM′ARAL′ZAMAN. A prince in one of the tales of the *Arabian Nights* who fell in love with the Princess Badoura as soon as he caught sight of her.

CAMARILLA, kä′mä-rē′lyä (Sp., little room, from Lat. *camara*, vault). As *camara* is used to designate the chamber of the King of Spain, the royal chamber, so *camarilla* is used to designate his private chamber or cabinet, the place where he receives his most intimate friends, courtiers, and sycophants. In the political language of modern Europe it has come to signify the influence exercised on the State by secret and unaccredited counselors, in opposition to the opinions of the legitimate Ministry. The camarilla is an old institution in Spain, but the word first began to be widely used in the time of Ferdinand VII.

CAMARINA, kä′mä-rē′nä (Gk. Καμάρινα, *Kamarina*). A ruined city in Sicily, about five miles in circumference and about 100 miles southwest of Syracuse, not far from the sea. It is east of the Camarina (ancient Hipparis) where, on a sand-hill 100 feet high, now stands the Chapel of the Madonna di Camarina. It was founded by Syracuse B.C. 599, destroyed in 553 for rebellion, rebuilt by Hippocrates of Gela in 492 after the battle of the Helorus, again depopulated in 484 by Gelon, who transferred the inhabitants to Syracuse, and again colonized from Gela in 461. In 405 Dionysius compelled the inhabitants to accompany him on his retreat, and it was destroyed by the Carthaginians. In 339 it was recolonized by Timoleon, and in 258 fell into the hands of the Romans, who sold most of the citizens into slavery. In A.D. 853 it was destroyed by the Saracens, who left only the ruined walls and temples that now attest its ancient splendor.

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CAMARGUE, kȧ'märg', ISLE DE LA. See BOUCHES-DU-RHÔNE.

CAM'ASS RAT (Am. Indian). The pocket-rat of the northwestern United States, which feeds mainly on the camass (*Camasia esculenta*). See GOPHER.

CAMAYEU, *Fr. pron.* kȧ'mȧ'yē', or MONOCHROME (Fr. *camaïeu*, cameo, and Gr. *μόνος, monos*, one + *χρῶμα, chrōma*, color). Terms by which painting in one color is designated. The ancients painted thus both in gray (*en grisaille*) and in red. Pictures of several tints, but where the natural colors of the object are not copied, are said to be *en camayeu*. As one color generally prevails, we speak of blue, red, yellow, green camayeu. Polidoro Caravaggio, for example, so overlaid his other colors with brown that his works give the impression of monochromo paintings. Drawings in India ink, red and black chalk, pencil, etc., as well as engravings, may be said to be *en camayeu*.

CAMBACÉRÈS, kän'bȧ'sȧ'rĕs', JEAN JACQUES RÉGIS, Duke of Parma (1753-1824). A French statesman. He was born in Montpellier, and became a member of the Convention, where his judicial training at once brought him into prominence. His moderation in the midst of stirring events was soon manifested, particularly in his attitude toward the condemnation of the King. After the fall of Robespierre, he succeeded for a short time to the presidency of the Convention, and he at once began working for peace at home and abroad. Forced from office, he devoted himself to his *Projet de code civil*, from which the Code Napoléon was derived. In October, 1796, he became president of the Council of Five Hundred, and in June, 1799, Minister of Justice. After the eighteenth Brumaire (November 9, 1799) he became Second Consul under Napoleon, who, on ascending the throne, made him High Chancellor of the Empire and in 1808 Duke of Parma. In 1813-14, while Napoleon was absent in the field, Cambacérès directed civil affairs as president of the Council of Regency, finally voting for Napoleon's abdication, but during the Hundred Days he reluctantly served Napoleon as Minister of Justice and president of the House of Peers. After the Second Restoration Cambacérès returned to Paris, but was exiled in 1816 as a 'regicide.' His legal and political rights were restored to him in 1818. He took no part in public life afterwards and died March 8, 1824.

CAMBAL'LO. The second son of Cambuscan, in Chaucer's *Squire's Tale*. In the prologue to the tale it is prophesied that the unfortunate falcon will "get her love again" by his 'meditation,' and that he will fight in the lists for Canace's sake. But how he accomplishes this is left unexplained. He appears in Spenser's *Faerie Queene* as Cambel.

CAMBALUC, käm'bȧ-lōōk', or **CAMBALU,** käm'bȧ-lōō' (Mongol *Khan-Baligh*, 'city of the Khan'). The former name of Peking (q.v.), China.

CAMBAY' (Hindi *Khambāt*, from Skt. *khambavatī*, possessing pillars). The capital of the native State of Cambay, Gujerat, India, standing at the head of a gulf of the same name, on the right bank of the Mahi, 76 miles to the north-northwest of Surat (Map: India B 4). It contains about 30,000 inhabitants, but was at one time much more populous; ruined palaces, mosques, and tombs, and an excavated temple of considerable pretensions, attest its former magnificence and extent. The gradual obstruction of seaward navigation has contributed to its decline. The export of cotton is the staple trade and it has celebrated manufactures of onyx, agate, and carnelian ornaments.

CAM'BEL. See CAMBALLO.

CAMBERT, kän'bȧr', ROBERT (c.1628-77). A French composer. He was organist of the Church of Saint Honoré, and musical superintendent to Anne of Austria, the mother of Louis XIV. At the suggestion of the Abbé Perrin, he composed *La pastorale* (1659), regarded as the first French musical comedy. Cambert may therefore be considered as the founder of French opera. Under the favor of Louis XIV. and Mazarin, the *Pastorale* was followed by *Ariane et Bacchus* (1661); *Pomone* (1671); and *Les peines et les plaisirs de l'amour* (1672). Together with Perrin, who furnished the text for his operas, Cambert became director of the first French opera house, the Paris "Académie Royale de Musique," but was soon superseded by his rival Lully. After Lully became musical superintendent to the King, Cambert went (1673 or 1674) to London, where he became master of the music to Charles II.

CAM'BERWELL. Part of Greater London. See LONDON.

CAMBERWELL BEAUTY. The English name for the widespread butterfly *Vanessa antiopa*, called the United States 'mourning-cloak' (q.v.).

CAMBIASO, käm-byä'sô, LUCA (1527-85). An Italian painter, born in Moneglia. He gained celebrity at an early age, and in 1583 was invited to Spain by Philip II. to assist in the decoration of the Escurial, in which he painted the ceiling of the choir, representing the "Assemblage of the Blessed," which is considered his best work. Among others of his works are the "Rape of the Sabine Women," the "Sleeping Cupid," and "The Martyrdom of Saint George."

CAMBIER, kän'byȧ', ERNEST (1844—). A Belgian explorer, born in Ath. In 1877 he accompanied the first expedition sent out by the International African Association as astronomer and geographer, and upon the death of Crespel was appointed chief of the expedition. He penetrated from Bagamoyo into the interior of Africa, proceeding to Unyamwezi, and thence to Karema on Lake Tanganyika, where, in September, 1879, he established the first post and scientific station of the International Association. He returned to Europe in 1882. Consult A. J. Wauters, *Le capitaine Cambier et la première expédition de l'Association Internationale Africaine* (Brussels, 1881).

CAMBI'NA. The mistress and eventual wife of Cambel in the *Faerie Queene*. She has inherited her mother's (Agape's) supernatural abilities.

CAM'BIUM (Neo-Lat., from Med. Lat. *cambire*, to exchange). A zone of actively dividing cells between the wood and bark of ordinary shrubs and trees. See ANATOMY OF PLANTS.

CAMBO'DIA (Skt. *Kambōja*). Once a powerful kingdom of extreme southeastern Asia;

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latterly a French possession, constituting one of the divisions of the general government of Indo-China (Map: Siam, K 8). Two of its provinces, however, have become annexed to Siam, its neighbor on the northwest. Cambodia is bounded by Annam on the east and by Cochin-China and the Gulf of Siam on the south. The parallel of 12° N. crosses it about the middle. Its area is about 37,500 square miles, divided among 57 native provinces. The country has scarcely been explored, and there is comparatively little known about it. It is generally level. The western, northwestern, and eastern portions, however, are more or less broken with wooded hills and plateaus, reaching a height of about 4000 feet in parts. The great waterway is the navigable Mekong River, which annually overflows and richly fertilizes a wide territory. An arm connects the Mekong with an extensive lake on the borders of Siam, called Tonle Sap, which, according to the alternations of low and high water, at one time discharges its surplus waters into that river and at another is replenished by the waters sent forth by the Mekong.

Despite the fact that Cambodia is in the torrid zone and on the whole a low-lying region, its climate is not as intolerably hot as might be expected, the heavy rains moderating the temperature. The main climatic features are determined by the monsoons. There are two seasons, the wet and the dry. The flora and fauna are characteristic of the Indo-Chinese region. Tigers, leopards, and elephants are found in many sections. Gold, silver-bearing lead, copper, iron, and lime exist, but only the last two are profitably available. The fisheries form a notable industry, both along the islands of the coast and on the Tonle Sap (q.v.).

Agriculture is the leading occupation. The well-populated river plains and islands produce rice, the main food of the country. Cotton, tobacco, pepper, cardamom, beans, sugar-cane, maize, indigo, the mulberry, coffee, cacao, and vanilla are grown. Cattle-raising is quite general. Some eighty kinds of valuable wood are found, such as ebony, rose, sapan, and pine. The gathering of these woods, together with palm-sugar, wax, and gum, forms a noteworthy branch of industry. Silk-weaving is a large domestic occupation. There are considerable factories for shelling cotton-seeds near the capital, Pnom-Penh (q.v.), a city of about 50,000 people, situated in the heart of the country. Cambodia has no seaport of commercial importance, Kampot having merely a local or inland trade. Generally speaking, however, easy communication is had, both by land and by water, with the interior. Telegraph lines connect the principal towns with each other, and with Burma. But there are no railways, no modernized facilities for transporting articles of commerce. The export and import trade is through Saigon, the capital of Cochin-China. The exports include chiefly rice, and salted fish (about 13,000 tons annually). Cotton, tobacco, gum, and wood are exported. The imports embrace silk stuffs, salt, wine, opium, textiles, and arms. The total annual value of the commerce, including both imports and exports, as given by French authorities, is about $5,000,000.

Cambodia has been under the protection of France since 1863. The government is a monarchy. The King has five ministers. In 1884, under the new treaty signed with King Norodom, the administration was practically handed over to France, the native functionaries being appointed by the King with the approval of the local French officials, who are under the direction of the Governor-General of French Indo-China, who is represented by a resident. The budget of Cambodia for 1901 was fixed at 1,951,487 piastres. The inhabitants are estimated at 1,500,000, nearly four-fifths of whom live in the river regions.

Outside of recent Annamite and Chinese immigrants and a considerable body of Malays, the population of Cambodia consists mainly of the Cambodians proper, or Khmers, formerly widespread over much of Indo-China, to whose half civilization belong the wonderful architectural remains of Angkor (now in Siamese territory), etc.; the Penong, or 'savages,' of the eastern table-lands and mountains, belonging, with the Mois of the adjacent regions, to a primitive element of the population; the Khois, or Kuis, another aboriginal group in the northwest; and lastly, the Tsiam, or Chiam, in the south, who seem to be the survivors of the extinct empire of Champa, once dominant over all eastern Indo-China. All these peoples are now considerably mixed, the Khmers most, the mountain aborigines least, with Aryan (Hindu), Dravidian, Malay, and Tibeto-Chinese blood and with the Hindu influence (the alphabet of the Cambodians and the sacerdotal vocabulary are of Pāli origin) predominating in religion, art, and literature among the more civilized sections. The Penong are rather short, dolichocephalic, much lighter-skinned than the surrounding peoples; the Khois, darker-skinned, taller, and inclined to be short-headed; the Tsiam, dark-skinned and rather handsome in form and features, with some negroid suggestion in hair, etc. The Khmers are taller and less Mongoloid in appearance than the Annamese, Siamese, and closely related peoples. In speech the Penong and Khois probably represent a primitive variety of Indo-Chinese stock. The Khmer language differs in certain marked respects from the latter, and, like that of Tsiam, is said to have Malayan affinities, but this is not clearly made out, and the speech of the Khmers is largely *sui generis*. Buddhism is the prevailing religion. Some of the Tsiam profess Islam. Christianity and education have scarcely made a beginning. The Khmers are peaceful and teachable, but phlegmatic. Polygamy is practiced, but not more than three wives are permitted. The dwellings are mostly along the river-banks. Slavery has almost disappeared, having been abolished by the French in 1884.

That Cambodia was once an extensive and powerful State and under a much higher grade of civilization than at present is shown by the superb architectural remains, the ruins of Angkor being especially noticeable. The early history of Cambodia, like that of Siam and Annam, with whose fortunes its own were often closely connected, is extremely obscure; but legend would seem to point to India as the source of the earliest migrations into the country. From Chinese notices it is known that a kingdom of Cambodia was already in existence not very long after the beginning of the Christian Era, and that, after a short period of submission to China, in the Sixth or Seventh Century, it attained to a high degree of splendor. With the beginning

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of the Fourteenth Century, the period of decadence set in, the kingdom grew exhausted in continuous warfare against Siam and Annam, and was forced to pay tribute to each in turn, or to both. The first Europeans in Cambodia were the Portuguese, who founded a mission there in 1553. The attempts made by the Dutch and the English to establish themselves in the region proved unsuccessful, and when the French first turned their attention to the land, in the middle of the Nineteenth Century, European influence was non-existent there.

Consult: Verschuur, *Aux colonies d'Asie et dans l'océan Indien* (Paris, 1900); Lagrillière-Beauclerc, *A travers l'Indo-Chine, Cochinchine, Cambodge, Annan, Tonkin, Laos* (Paris, 1900); Leclère, *Cambodge, contes et légendes* (Paris, 1895); id., *Recherches sur la législation cambodienne: Droit privé* (Paris, 1890); *Droit public* (1894); *Législation criminelle* (1894); Wake, "Les Cambodgiens et leur origine," in the *Revue d'Anthropologie* (1886); Bergargne, "L'ancien royaume du Campa," in the *Revue Asiatique* (1888); Fournereau, *Les ruines khmères* (Paris, 1890).

CAMBODIA RIVER. See MEKONG.

CAMBOGE, kăm-bōj'. See GAMBOGE.

CAMBON, kăn'bôn', JULES MARTIN (1845—). A French legislator and diplomat, brother of Pierre Paul Cambon. He was born in Paris, and began the practice of law in 1866. After serving in the war of 1870-71, he was appointed auditor of the provisional commission appointed in 1871 to replace the Council of State. In 1874 he was appointed director-general of the civil affairs in Algeria; in 1879, secretary-general of the prefecture of police in the Department of the Seine; and in 1891 Governor-General of Algeria. He was Ambassador of France at Washington from 1891 to 1902, and in this capacity negotiated the preliminaries of peace between the United States and Spain.

CAMBON, PIERRE JOSEPH (1754-1820). A French financier and politician. He was born in Montpellier, and was a merchant there at the beginning of the French Revolution. He was a member of the Legislative Assembly in 1791 and of the Convention in 1792. From the outset he devoted himself to financial questions, of which he speedily showed himself a master. As France, during the Revolution, was at war with all Europe, vast sums of money had to be raised. The financial condition was desperate, due to the excessive number of assignats in circulation and their consequent depreciation, and also to the general ignorance as to the actual debt of the country. Cambon proposed to prepare a 'grand livre' of the national debt. This plan was set forth in his great *Rapport sur la dette publique* (August 15, 1793), on which his fame as a financier chiefly rests. Cambon was a member of the first Committee of Public Safety. Throughout the Reign of Terror he was the real administrator of the finances. He opposed the financial measures of Robespierre, who attacked him by name in the Convention. Later he was arrested for having defended Callot d'Herbois and other members of the Committee of Public Safety, but was released in the general amnesty of 1795. In 1815 he sat in the Chamber during the Hundred Days. He was finally exiled as a regicide in 1816, and he died in Brussels.

CAMBON, PIERRE PAUL (1843—). A French legislator and diplomat, born in Paris. He became chief of Cabinet of the Prefecture of the Seine, under Jules Ferry, in 1870, and thereafter Secretary-General of the departments of Alpes-Maritimes and Bouches-du-Rhône (1871), and prefect of Aube (1872). Subsequently he held several other prefectures, but in 1882 abandoned the legislative for the diplomatic service, and after filling the position of Minister of France to Tunis, was successively appointed Ambassador to Madrid (1886), Constantinople (1890), and London (1898).

CAM'BORNE. A market-town of Cornwall, England, 10 miles west-northwest of Falmouth (Map: England, A 6). It is surrounded by very productive copper, tin, and lead mines. Its parish church is a handsome Gothic structure. Population, in 1901, 14,700.

CAMBRAI, or **CAMBRAY**, kăn'brā'. A town of France in the Department of the Nord (French Flanders), situated on the right bank of the Scheldt, 121 miles by rail north-northeast of Paris (Map: France, K 1). It is well built, and has a fine cathedral containing the remains of Fénelon, Archbishop of Cambrai, a magnificent town hall, and a number of other fine buildings. Cambrai is the seat of an extensive textile industry, and contains, besides, a number of sugar-mills, soap-factories, tanneries, and many other industrial establishments. Cambrai was known to the Romans under the name of Camaracum, and it was then one of the chief cities of the Nervii. It was fortified by Charlemagne, and was long governed by its own bishops. Here was formed in 1508 the celebrated League of Cambrai, consisting of the Pope, the Emperor of Germany, and the kings of France and Spain, whose object was the destruction of the Republic of Venice. Here, also, was concluded in 1529 the peace between Francis I. and Charles V., known as the *Paix des Dames* ('Ladies' Peace'), the preliminary negotiations having been conducted by Louise, mother of the French King, and Margaret, aunt of the German Emperor. Cambria has been in possession of France since 1677. Consult Dinaux, *Bibliographie Cambrésienne* (Douai, 1822). Population, in 1896, 14,306.

CAM'BRIA. The ancient name of Wales, the Britannia Secunda of the Romans. The name is derived from that of the Cimbri, or Cymri, by which the Welsh have always called themselves.

CAM'BRIAN SYSTEM. The name given to the great series of sedimentary deposits which comes next in order of succession to the Archæan, the lower beds of the Cambrian system resting unconformably on its upturned edges. The name Cambrian, derived from Cambria, the ancient name of Wales, in which country the beds of this age were first recognized, was given by Adam Sedgwick, an eminent English geologist, who devoted his life to the study of this formation. The upper limits of the Cambrian, as there studied, were in much dispute for a time, since many of the beds placed by Sedgwick in the Upper Cambrian were claimed by Murchison to be Lower Silurian; and this, indeed, was subsequently found to be the case. To these disputed beds the name Ordovician (q.v.) was given by Lapworth (1879). Fossils are very scarce in the Cambrian rocks in many

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places, but in other localities, where different members of the formation are exposed, life remains abound, showing a profusion of marine invertebrates and plants of low order. The animal remains include, in order of their importance, crustaceans, brachiopods, pteropods, worms, gastropods, hydrozoans, echinoderms, sponges, corals, lamellibranchs, and cephalopods. All of these, except the cephalopods, were represented in the earliest periods of the Cambrian system.

While the great thickness of Cambrian strata indicates a long period of sedimentation, still the great changes that we find in the faunas in passing from one division of the Cambrian system into another are considered remarkable, since they indicate a most complete revolution in the life forms in any one region. Thus, of the many trilobites found in the Lower Cambrian, but few are known in the middle division; and these, in turn, differ markedly from those in the Upper Cambrian. The reason for this absence of transitional types may be due to the fact that the intermediate beds containing them have not yet been discovered. The trilobites were a prominent feature of the Cambrian system, and varied much in size, from under an inch, like the small, blind ones, agnostus, to others having a length of two feet, as paradoxides. No vertebrate remains have been found. There is no evidence of invertebrate life that existed on land in fresh water, although it is quite possible that some of the mollusks found may have lived in estuaries of brackish water, for the character of many of the sedimentary rocks of Cambrian time, such as grits, with ripple-marks, is indicative of shallow-water conditions.

The thickness of the Cambrian system is variable. In Newfoundland it is about 6000 feet; in Vermont and eastern New York, 7000 feet; in British Columbia, 10,000 feet. The Cambrian rocks include sandstones, limestones, shales, slates, marbles, and quartzites, with occasional igneous rocks, as in the Lake Superior region and southeastern Pennsylvania, and also in Great Britain. The metamorphosed Cambrian rocks are found in areas of much folded strata. In America the Cambrian rocks have been classified under: (1) *Georgian* series, or Lower Cambrian, a local development in Michigan being known as the *Keweenawan*, or *Keweenian;* in this the trilobite olenellus is often common. (2) *Acadian*, or Middle Cambrian, in which the tribolite paradoxides is abundant in places. (3) *Potsdam*, or Upper Cambrian.

In North America Cambrian rocks are found in Newfoundland, Nova Scotia, New Brunswick, and Canada: also in Vermont, Massachusetts, Maine, New Hampshire, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Tennessee, Alabama, Georgia, Michigan, Wisconsin, North Dakota, California, Colorado, Arizona. In foreign countries, they are known in Great Britain, Germany, Bohemia, Scandinavia, France, Spain, Sardinia, China, Australia, and India. The British, Bohemian, and Scandinavian areas are of classic interest. The economic products of the Cambrian system in the United States include the slates (q.v.) and limonite ore (q.v.) of the Appalachian States, sandstone in New York, and copper ores in Michigan.

Consult: Walcott, *Tenth Annual Report United States Geological Survey* (Washington, 1888); *Bulletin 81, United States Geological Survey* (Washington, 1891); Dana, *Manual of Geology* (New York, 1895); Geikie, *Text-book of Geology* (London, 1893). See GEOLOGY; POTSDAM SANDSTONE.

CAMBRIC, kām'brĭk. A general term applied to the finest and thinnest of linen fabrics. It is said to be derived from Cambrai (France), where such goods were first made. Some of the finest cambrics of the present day are produced in Switzerland. Scotch cambric is really a muslin, and is made of cotton with the fibre twisted very hard, to imitate real or linen cambric.

CAMBRIDGE, kām'brĭj (Cam bridge; Neo-Lat. *Cantabrigia*). The county-town of Cambridgeshire, England, situated on the Cam, about 57 miles north-northeast of London (Map: England, G 4). The town, as a whole, is less picturesque than its rival, Oxford, and its main street, Trumpington, does not compare favorably with the famous High Street of Oxford. On the other hand, many of its college buildings are, from an architectural standpoint, the equal of any which its sister university possesses; and the beautiful lawns and gardens behind the colleges, traversed by the Cam, familiarly known as 'the Backs,' certainly equal in beauty the justly praised Christ Church Meadow of Oxford. Apart from the colleges and the buildings immediately connected with them, Cambridge possesses few interesting features. The Church of the Holy Sepulchre is worthy of note as being one of the four existing round churches in England. Cambridge is a Parliamentary borough, and sends one member to the House of Commons. The city maintains a large public library and makes large grants to a number of schools. Its water, gas, and electric-light plants are in the hands of private companies. Its drainage and sewerage system has been recently improved. Population, in 1891, 37,000; in 1901, 38,400. Cambridge, probably on the site of the *Camboritum* of the Romans, takes its name from the river Cam, which was anciently, and is still in its upper reach, called the Granta. To the Saxons, Cambridge appears to have been known as Grantabrydge. In 870 the Danes ravaged the country hereabouts, and are said to have destroyed the town. William the Conqueror built a castle here, and the town received its first charter from Henry I. in 1118. King John, in 1200, granted a charter to the town, permitting it to have a guild of merchants, and in 1207 confirmed the burgesses in their privileges in perpetuity. See CAMBRIDGE, UNIVERSITY OF.

BIBLIOGRAPHY. Atkinson, *Cambridge Described and Illustrated* (London, 1897); Humphry, *Cambridge* (Cambridge, 1880); Maitland, *Cambridge Township and Borough* (Cambridge, 1898); Wood, "Cambridge in Early and Mediæval Times," in *Builder*, Vol. LXXXI. (London, 1901).

CAMBRIDGE. A village and county-seat of Henry County, Ill., 30 miles southeast of Rock Island, on the Rock Island and Peoria Railroad (Map: Illinois, B 2). It is the centre of a fertile agricultural region, and exports live stock and grain. Population, in 1890, 940; in 1900, 1345.

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CAMBRIDGE. A city and county-seat of Dorchester County, Md., 60 miles southeast of Baltimore, on the Choptank River, and on the Seaford and Cambridge Railroad, which connects with the Philadelphia, Wilmington and Baltimore at Seaford, Del. (Map: Maryland, N 6). It is the centre of a rich agricultural district, and has an extensive oyster-canning industry, and important manufactures of underwear and lumber. Settled in 1684, Cambridge was incorporated as a Colonial town early in the Eighteenth Century; the present city charter dates from 1900. Under its provisions, the mayor is elected every two years by the city council, which consists of the executive and four aldermen, chosen by the city wards. Population, in 1890, 4192; in 1900, 5747.

CAMBRIDGE. A city, the seat of Harvard University, and one of the county-seats of Middlesex County, Mass. It is on the Charles River opposite Boston, of which it is practically a suburb, being connected by several bridges (Map: Massachusetts, E 3). It is entered by the Boston and Albany and the Boston and Maine railroads, and electric railroads connect with Boston and adjacent towns. The historic divisions are still locally known as Old Cambridge, North Cambridge, East Cambridge, Cambridgeport, and Mount Auburn. Cambridge is irregular in shape, generally level in surface, and covers an area of about 6½ square miles. Its streets and avenues are shaded with beautiful old trees, and there are many handsome residences and well-preserved Colonial mansions, among them the Craigie House, occupied by General Washington, and later the home of the poet Longfellow, now fronted by a memorial park, and Elmwood, the dwelling of James Russell Lowell. The principal features of Cambridge are Harvard University (q.v.), with its ample grounds and many buildings, Radcliffe College (q.v.), the buildings of the Protestant Episcopal Divinity School, the First Parish Church (Unitarian), the Shepard Memorial Church (Congregational), commemorating Rev. Thomas Shepard (q.v.), and Christ Church (Protestant Episcopal). The city common contains a soldiers' monument and a statue of John Bridge. Less than a mile from the university are the Howard Observatory and the botanical gardens of eight acres, filled with a great variety of trees, shrubs, and plants, especially of native species. Mount Auburn Cemetery, partly in Cambridge, one of the most beautiful places of burial in the country, contains the graves of Longfellow, Lowell, Phillips Brooks, and many other distinguished men. Among prominent buildings, other than those already mentioned, must be noted the public library, Cambridge Hospital, the Latin School, High School, Rindge Manual Training School, the city hall, the court-house, jail, and other county buildings. Cambridge has a fine system of public parks; besides Interior Parks, the River Parks include the entire river-front, and add greatly to the beauty of the city.

Among the industrial establishments of Cambridge are the Riverside, Athenæum, and University presses, the latter dating from the earliest printing house in America, founded in 1639, which are all widely known. There are also large foundries and machine-shops, meat-packing houses, and extensive manufactures of soap and candles, pianos and organs, furniture, confectionery, rubber goods, boilers, chemicals, astronomical instruments, carriages and automobiles, bricks, and many other articles. The industries are centred principally in Cambridgeport and East Cambridge.

Cambridge is governed, under the charter of 1891, by a mayor, elected annually, and a bicameral municipal council, of which the board of aldermen is elected at large and the common council by wards. In the administrative departments, the majority of officials are appointed by the mayor, subject to the confirmation of the board of aldermen; the city council, however, elects the city clerk and assistant, treasurer, auditor, messenger, clerk of committees, solicitor, and overseer of the poor; and members of the school board are chosen by popular election. Cambridge owns and operates its water-works. Some features of municipal politics deserve mention. Cambridge is noted as the largest city in the world with no open saloons, and the no-license system, as operated under the Massachusetts law, seems well established. Municipal elections are conducted by local parties entirely independent of national and State organizations.

HISTORY. Cambridge originally included the present towns of Lexington, Arlington, and the Brighton district of Boston. It was settled at Newtowne, in 1630, by Governor Winthrop and others, who intended it to be the chief place of the Colony, but found the peninsula of Shawmut (Boston) better adapted for commerce and for defense against the Indians. Resettled in 1631, it received, in 1633, its first pastor and teacher, Rev. Thomas Hooker (q.v.) and Rev. Samuel Stone (q.v.), who removed with their congregation to Connecticut in 1636, largely owing to ecclesiastical differences. In 1637 the General Court ordered that the college it had previously decided to found be established at Newtowne, and in 1683 that Newtowne become Cambridge. In the same year the first class began its studies, and the name Harvard College was given to the modest institution. (See HARVARD, JOHN.) During the time Boston was held by the British Army (1775-76) Cambridge was occupied by the American Army, and Washington assumed command in 1775 under a large elm, which is still standing. The city charter of incorporation was granted in 1846. Cambridge claims to have enlisted the first company of volunteers for service on the Northern side at the outbreak of the Civil War, and during that conflict it furnished 4588 men to the Union army and navy. The city has been the home of many famous literary men, notably of Longfellow, Lowell, and Holmes.

Population, in 1790, 2111; in 1830, 6072; in 1850, 15,215; in 1880, 52,669; in 1890, 70,028; in 1900, 91,886, including 30,500 persons of foreign birth and 3900 of negro descent.

Consult: Paige, *History of Cambridge* (Boston, 1877); Hurd (editor), *History of Middlesex County* (Philadelphia, 1890); and Powell, *Historic Towns of New England* (New York, 1898).

CAMBRIDGE. A village in Washington County, N. Y., about 30 miles northeast of Albany, on the Delaware and Hudson Railroad (Map: New York, G 2). It is noted principally as the seat of the Cambridge Valley Agricultural

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and Stockbreeders' Association. Population, in 1890, 1598; in 1900, 1578.

CAMBRIDGE. A city and county-seat of Guernsey County, Ohio, 85 miles east of Columbus, on the Baltimore and Ohio and the Pennsylvania railroads (Map: Ohio, G 5). The surrounding region has deposits of fine pottery clay, natural gas, coal, and iron; these with the manufacture of various products of iron and steel, glass, and pottery, are the principal fields of industry. The city owns and operates its water-works, and has a public library. Settled in 1806, Cambridge was incorporated in 1837. It is governed by a charter of 1893 which provides for a mayor, elected biennially, and a city council. Population, in 1890, 4361; in 1900, 8241.

CAMBRIDGE, Ada (1844—). The pseudonym of Mrs. George Frederick Cross, novelist, born at Saint Germains, Norfolk, England, and after 1870 a resident of Victoria, Australia. She has become widely known by *A Marked Man* (1891); *The Three Miss Kings* (1891); *A Little Minx* (1893); *At Midnight* (1897); *Materfamilias* (1898); *Path and Goal* (1900); and *The Devastators* (1901). She has also written several poems displaying lyrical power. See Australian Literature.

CAMBRIDGE, George William Frederick Charles, second Duke of (1819—). An English soldier, son of Adolphus Frederick, Duke of Cambridge. He was born in Hanover, and succeeded to his title in 1850. In 1837 he was colonel, and in 1854 lieutenant-general, commanding the first division sent in aid of Turkey against Russia. He led the troops at the Alma and at Inkerman. In consequence of ill health he returned to England, and in 1856 became acting commander-in-chief of the British Army. He was made field-marshal, and in 1887 received the patent of commander-in-chief. In 1895 he was retired, and succeeded by Lord Wolseley (q.v.).

CAMBRIDGE, University of. The younger of the two ancient seats of learning in England. The origin of the university, like that of Oxford, is obscure. The old Benedictine establishment in Cambridge was swept away by the Danish invasions, and the university cannot boast the continuous existence beyond the Conquest assigned to it by the older writers. Though we may disregard the various fables of its foundation by a Spanish King, Cantaber, by King Arthur, by a Saxon King, Sigebert, and by Gislebert and his three companion monks of Croyland, it seems very probable that the university originated in some local educational movement during the Twelfth Century, augmented, as time went on, by such influences as the migration of Oxford students thither in 1209, and of students from Paris in 1229. As early as 1231 a chancellor is mentioned in a royal writ, and two years later the university received Papal recognition. Following the example of Paris, Cambridge maintained, besides the trivium and quadrivium (q.v.), or faculty of arts, the advanced faculties of theology, civil and canon law, and medicine. It was, however, not recognized formally as a Studium Generale until the Papal bull of 1318. Like Paris, too, Cambridge was governed by a guild or corporation of masters, resident teachers called regents, with whom resident masters not engaged in teaching, called non-regents, were later associated. The presiding officer, called the chancellor, was elected by the regents. To this new university the mendicant orders came very early, the Franciscans about 1224, the Dominicans half a century later. These, as well as other bodies of monks and of friars, established houses for their members, and for a time played a considerable part in university affairs, but their permanent influence was, save perhaps in one direction, not great. In the earlier stages of the university the students, here as elsewhere, had boarded and lodged independently. With the increasing size and importance of Cambridge there now arose, alongside these religious houses, voluntary associations of students, living together in independent hostels or halls. Private benefactors, finding in these fit subjects for encouragement, presently began to endow these halls, or to establish 'colleges,' often by the consolidation of several halls. This new form of institution, providing for the support of deserving students, combined the idea of supervision and support of the religious houses, with that of the independence of the halls. The collegiate system, beginning on the Continent, seems to have been carried to Cambridge by way of Oxford, and, though not original with either, has survived in them alone, giving them their unique place among the universities of the world. The first of the Cambridge colleges, Peterhouse, a purely academic organization with no monastic discipline, was founded in 1284 by Hugh of Balsham, Bishop of Ely, and from this time for almost exactly three centuries the foundation of colleges continued. With one exception, the Cambridge of to-day is formed of the colleges established during that period. In this, Cambridge differs much from Oxford, for though four colleges were founded in Oxford in the Seventeenth and Eighteenth centuries, the only permanent collegiate foundation in Cambridge since 1596 is Downing College, established in 1807. The short-lived Cavendish College, Selwyn College (1882), a 'hostel,' and the foundations for women, Girton (1869) and Newnham (1875), are not formally connected with the university. (A list of colleges, with the dates of their foundation, will be found at the end of this article, and separate notices of the colleges under their names in the body of the Encyclopædia.)

The university, thus constituted, played a great part in the Reformation. Humanism entered Cambridge early, associated with the names of Sir John Cheke, Sir Thomas Smith, and Bishop Fisher. Of those closely associated with the Reformation, Erasmus was Lady Margaret professor of divinity from 1511 to 1514, and translated the New Testament here. Here, too, William Tyndale and Hugh Latimer began their labors in the new cause, and from here came Cranmer, who, in more ways than one, shaped the English Reformation in later years. The Royal Injunctions of 1535 mark an epoch in the history of the university, for by them the new learning was finally established. The study of the canon law was discontinued, public lectures in Greek and Latin were established in the colleges, the Bible, studied in the light of the new learning, replaced the Sentences, and the humanistic method took the place of the scholastic. As elsewhere, the recognition of the royal supremacy was enforced here, and with these sweeping

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changes, and the replacing of the clerical element in the university by lay students, the mediæval history of Cambridge may be said to close and its modern history to begin.

For the moment, however, here, as in all universities which took a leading part in the Reformation, the immediate effect of that movement was disastrous. It was not until the reign of Elizabeth that Cambridge began to recover from the shock. Then it became the stronghold of advanced Puritanism, as it had earlier been of advanced Protestantism, particularly under the influence of Cartwright, who was finally deprived of his official position in the university on this account. Largely owing to the disturbances arising from this, new statutes were enacted in 1570, which lasted till the middle of the Nineteenth Century. By these the government of the university was practically vested in the heads of the colleges, who alone elected the vice-chancellor and the *Caput*, or supervising board. This turned Cambridge into a close corporation, a misfortune not bettered by the fact that with it went a tendency to turn the university into a school of divinity. The reign of James I. is memorable as the period when the university was granted the privilege of returning two members to Parliament, which it still enjoys. The later Seventeenth Century saw the rise of the school of Cambridge Platonists, and, chiefly by the influence of Isaac Newton and Isaac Barrow, the beginnings of that tendency toward the cultivation of mathematics and the natural sciences, which is still one of the chief distinctions between Cambridge and Oxford. During the Eighteenth Century, until the rise of the Evangelical School, the same mediocrity and apathy in religious matters prevailed here as elsewhere, but scholarship was improved by the evolution of the tripos into something like its present position. The Nineteenth Century saw sweeping changes, the reorganization of colleges and university, greater freedom in academic matters, the abolition of religious tests, and a more liberal idea of the importance of certain studies as well as of the relations between certain lines of work. Between 1840 and 1850 several colleges secured new charters from the Crown, and in the latter year a commission began a revision of the statutes, which led to the replacing of the Elizabethan statutes by those of the new commission in 1858. These were in turn altered in 1869 and 1871-72, and in the latter year another commission was appointed, on the strength of whose report (1874), and of a memorial issued by an influential body in the university, the Universities of Oxford and Cambridge Act was passed in 1877, and approved by the Crown in 1882. This effected a reorganization of the entire university system. Meanwhile, various internal changes had been taking place. To the older triposes of classics and mathematics, were added the law tripos in 1858, divided into law and history in 1872, the Semitic language tripos in 1878, the Indian language tripos in 1879, the mediæval and modern language tripos in 1886.

The university at present is a self-governing corporation, administered by a senate, consisting of all doctors and masters, of whom only those in Cambridge have electoral rights. The Council of the Senate, consisting of the chancellor, the vice-chancellor, four heads of colleges, four university professors, and eight associates from the senate, prepares agenda for the senate, chooses the vice-chancellor, and in general carries on the ordinary administration of the university. The funds are managed by a financial board, the curriculum is arranged by a general board of studies, separate departments being in the hands of sub-committees, or special boards. The chancellor is an honorary official, as at Oxford, usually some dignitary of the realm, as are also the steward and the deputy steward. The vice-chancellor is the real head of the university, and is assisted by deputies and by two proctors, who, besides their duties in the senate, have charge of university discipline. There are, moreover, two esquire bedells, the public orator, a commissary, an assessor, and the registrar, who has charge of records. There are at present seventeen colleges besides the two foundations for women, several special semi-collegiate institutions not a part of the university, and a body of non-collegiate students. The university proper, as distinguished from the colleges, is possessed of several important institutions. The Fitzwilliam Museum, founded by Viscount Fitzwilliam in 1816, is one of the largest and finest institutions of its kind in England. The university library contains some 200,000 volumes, and a considerable collection of MSS. There are also fine geological and anatomical museums, an excellent observatory, and the university practically controls the extensive printing and publishing establishment of the Pitt Press, as well as Addenbrooke Hospital. Examinations are held and degrees are conferred in the Senate House, which contains also the public offices of the university, and is the meeting-place of the senate.

The existence of the colleges in connection with the university forms a peculiar, and, save for Oxford, a unique educational organization, not easy for an outsider to understand. Briefly, it may be said that the college and the university are separate corporations, in large measure independent of each other, but connected very closely by the fact that they form interacting parts of an educational system, and that they are composed of, and managed by, the same individuals. The university is essentially an examining and degree-conferring body, which examines the candidate at entrance, during his residence, and at the conclusion of his work, and confers degrees on those men who meet its requirements. It regulates the system of education, with respect not only to subjects, but also to quality, and quantity of preparation, it enforces general discipline, and it offers certain educational advantages in its lectures, its libraries, its collections, and similar provisions. The college, on the other hand, receives the entering student, provides him with lodgings and meals, service, and the like, prepares him, by its tutors, for the university examinations, affords him society and recreation, and exercises somewhat more than paternal oversight of his actions. The administration of the colleges is in the hands of a master and fellows, from among whom are chosen the college officials, dean, bursar, and the like, as well as the teaching or tutorial force of the college. These men, as masters of arts of the university, form a great part of the senate, and so virtually govern it as well as the colleges.

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Undergraduate life at Cambridge differs somewhat from that at Oxford, and very greatly from that in the United States. Formerly, all men belonged to colleges, and though since 1869 it has been possible for men to belong to the university without being members of a college, the class of non-collegiate students thus created has never been very large, most undergraduates being connected with a college. Unlike Oxford, certain older distinctions among these are still maintained at Cambridge. Four classes of students are recognized: fellow-commoners, youths of rank or fortune, with special privileges; scholars, chosen by examination, and generally receiving some financial aid, as well as certain privileges; pensioners, or ordinary undergraduates; and sizars, poor students, partly or wholly supported by the college. The great majority of men live in college, though many of those belonging to colleges, and all the non-collegiate students, live in lodgings in the town. There are three terms in the university year, the Michaelmas, or October term; the Lent, or winter term; and the Easter, or spring term. These nominally include 227 days, but actually average each about eight weeks of required residence, leaving long vacations, during which much of the actual work, or 'reading' as it is called, is done. The students are under the direct charge of the tutors, who maintain personal relations with each man under their charge and supervise his work, directing him in a way not known to the educational system in the United States with its large classes and entire or partial absence of personal relation between student and instructor.

The degree of B.A. may be conferred, after the required examinations have been passed, at the end of nine terms or three years of residence. The degree of M.A. is attainable four years later, not in course, but in consideration of the pursuit of literary or scientific work. The university confers also degrees in law, theology, medicine, music, and an advanced degree in science, all of these latter being dependent on the possession of the bachelor's degree. Certain honorary degrees are also conferred, notably that of Doctor of Laws (LL.D.).

There are no exact equivalents at either of the English universities for the course of study common in the United States. The system of education is based upon, and conditioned by, the examinations which a candidate for the degree of B.A. must take. These are three in number. The following, from the 1900-01 regulations, will give the best general idea of the system. The 'previous' examination consists of two parts, one of the Gospels (Greek), one Latin classic, one Greek classic, one translation of English into Latin, and a paper on Latin and Greek accidence and syntax, forming the first part. The second consists of Paley's *Evidences*, geometry, arithmetic, elementary algebra, and an English essay. Candidates for honors must take the additional subjects of mechanics, French, and German. The second or 'general' examination consists of two parts, the first including one Greek classic, one Latin classic, algebra, elementary statics, a translation of English into Latin prose; the second, the *Acts of the Apostles* (Greek), some portion of English history, an English essay on a subject connected with the history offered, elementary hydrostatics, and some play of Shakespeare or a portion of Milton's works. The special or final examination may be taken in any one of the following subjects: theology, logic, political economy, law, history, chemistry, physics, geology, botany, zoölogy, physiology, mechanics, and applied science, music, modern languages, mathematics, or classics. For those men who are candidates for honors, special examinations, called triposes, are provided in mathematics, classics, moral sciences, natural sciences, law, history, theology, Oriental languages, mediæval and modern languages, and mechanical sciences. The successful candidates in the triposes are arranged in three classes, according to their standing, and have their names printed in the Calendar. In all save the mathematical tripos, these divisions are called simply first, second, and third class. The honor men in mathematics, however, are known as wranglers, senior optimes, and junior optimes, and the head of the first list, the best man of the year, is known as the senior wrangler.

Women are admitted to the examinations, and have their names appear in the Calendar, next to the tripos lists, with their rank attached, but are not allowed degrees.

For further information on the university there are a number of books available. The *History of the University of Cambridge*, by J. Bass Mullinger, in two volumes (Cambridge, 1873-84), covers, so far, only the period to 1625, but is the best as well as the fullest account up to that time. There is an excellent, though briefer, account of the university and colleges before 1500, in H. Rashdall, *Universities of Europe in the Middle Ages* (Oxford, 1895). Official information may be obtained from the Cambridge University Calendar, and from the announcements of lectures and such publications as are issued from time to time. Much incidental information may be obtained from Sir G. M. Humphrey's *Guide to Cambridge*.

See, also, the articles in the present work on UNIVERSITY; EDUCATION; NATIONAL EDUCATION, and on the various colleges under their names.

The colleges in the order of their foundation, with dates and founders, are as follows:

Peterhouse, or Saint Peter's College, 1284, by Hugh of Balsham. Clare, 1326, by Elizabeth, Countess of Clare. Pembroke, 1347, by Mary de Saint Paul, Countess of Pembroke. Gonville and Caius, 1348, by Edmund Gonville; refounded by William Bateman, 1353, and later by John Caius, 1558. Trinity Hall, 1350, by William Bateman, Bishop of Norwich. Corpus Christi, 1352, by Guilds of Corpus Christi and Virgin Mary. King's, 1441, by Henry VI. Queen's, 1448, by Margaret of Anjou; refounded, 1465, by Elizabeth Woodville. Saint Catharine's, 1473, by Robert Wodelarke. Jesus, 1496, by John Alcock, Bishop of Ely. Christ's, 1505, by Margaret of Richmond and Derby. Saint John the Evangelist, 1511, by Margaret of Richmond and Derby. Magdalene, 1519, by Thomas, Baron Audley of Walden. Trinity, 1546, by Henry VIII. Emmanuel, 1584, by Sir Walter Mildmay. Sidney Sussex, 1596, by Lady Frances Sidney, Countess Dowager of Sussex. Downing, 1800, by Sir George Downing.

Public Hostels.—Cavendish College, extinct, 1876-91. Selwyn College, 1882, by subscription. Ayerst Hall, extinct, 1884-96.

CAMBRIDGE PLATFORM. See CONGREGATIONALISTS.

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CAMBRIDGE PLATONISTS. A school of writers in the English Church, members of the University of Cambridge, in the latter part of the Seventeenth Century, who sought to exhibit the entire rationality of the doctrines of the Christian religion, and drew largely from Plato in execution of this purpose. They were the liberals of their age, and were often styled 'Latitudinarians.' There had been a liberal party in the early part of the century, but its liberalism was concerned with Church polity. It sought to maintain a comprehensive Church. The liberalism of the Cambridge Platonists took another direction, for they sought to emphasize the great Christian doctrines to the neglect of minor matters, often made the instruments of sectarian exclusiveness, and to show that these great doctrines were identical with the teachings of the soundest philosophy. With a single exception (More, educated at Emmanuel College, and of the Puritan party), they worked in great harmony: while they naturally belonged to the party that had formulated the Puritan theology in the Westminster Confession, they were led, by the prevailing laxity of morals and the multiplication of sects, to endeavor to overcome the schism between divinity and morals. They were powerfully influenced by the philosophical currents of their time, particularly by the writings of Descartes (Cudworth and Keon), less so by those of Bacon. But as a school, they were formed by the study of Plato, and of the Christian Fathers who followed the Platonic course of thought—those of Alexandria. On the other hand, the school was largely determined by its fundamental antagonism to the doctrines of Hobbes, who founded his philosophy on the senses, and ignored the moral and religious postulates of human nature. Against this philosophy the Cambridge Platonists waged uncompromising and unceasing war. Their liberalism, however, brought them into suspicion, and they were generally regarded with disfavor.

The principal representatives of this school were the following:

Benjamin Whichcote, born in Shropshire, March 11, 1609-10, died at Easter, 1683, in Cambridge. His father was apparently a country squire, the owner of Whichcote Hall. He was sent to Emmanuel College in 1626, took his B.A. in 1629, and his M.A. in 1633, when he became fellow of his college. In 1636 he was ordained, in 1643 presented to the living of North Cadbury, where he probably married. He was made provost of King's College, Cambridge, in 1644, and continued to occupy this post till the Restoration, 1660, when he was displaced by the royal order. His great work here was performed as a teacher, and particularly as the preacher of the Sunday afternoon lecture in Trinity Church. In these sermons he sought to lift the plane of current religious thinking, and he exercised the great influence which belongs to those whom the sight of a receptive audience quickens to eloquence. After his removal he occupied two different charges in London, spending his last fifteen years in Saint Laurence Jewry, where he was attentively heard by a small but select congregation. He published nothing himself. After his death a few sheets of *Select Notions* were published in 1685, a *Treatise of Devotion* in 1697, then *Select Sermons* (1698) with a preface by the Earl of Shaftesbury (reprinted, Edinburgh, 1742); and in the years 1700 ff. a new edition of the sermons from the author's own MSS. in four volumes, with a volume of *Aphorisms* (1753).

John Smith, one of the most gifted of the school, born at Achurch, Northamptonshire, 1618, died August 7, 1652, has left behind almost no materials for a biography. He entered Emmanuel College, Cambridge, in 1636, took his B.A. in 1640, and his M.A. in 1644, at which time he was chosen fellow of Queen's College. His health seems to have been precarious from the first. His labors were principally confined to his office as teacher, for which he had remarkable qualifications. His preaching was with a rare degree of eloquence, which can still be felt in the *Discourses* (1660), which remain to us. He gained much local fame as a lecturer on mathematics. His personal character was such as to excite the admiration and love of his associates in a remarkable degree. As a founder of the school, his special service was in developing the foundations of a Christian philosophy.

The two most famous of the Cambridge Platonists are *Ralph Cudworth* and *Henry More*, whose lives will be found in their alphabetical places in this Encyclopædia. More obscure were *Nathaniel Culverwel*, of a genius and eloquence like Smith's, who entered Emmanuel in 1633 and took his M.A. in 1640, was a fellow and preacher in the College Chapel, died about 1651, and whose *Discourse of the Light of Nature* was published 1652; *John Worthington*, a native of Manchester, educated at Emmanuel College, Master of Jesus College till the Restoration, then held a succession of livings, and finally Hackney, where he was chosen lecturer in 1670, his *Discourses* being published in 1725, and *Miscellanies* in 1704; *George Rust*, fellow in Christ's College in 1657, after the Restoration in Ireland, where, in 1667, he became Bishop of Dromore, died in 1670, his *Discourse of Truth* appearing in 1682; *Simon Patrick* (1626-1707), Bishop of Chichester, 1689, and of Ely, 1691; *Edward Fowler*, took his M.A. in Trinity College, Cambridge, about 1655, finally Bishop of Gloucester; *Joseph Glauvill* and *John Norris*, both Oxford students, but impregnated with the spirit of the Cambridge Platonism. Consult John Tulloch, *Rational Theology and Christian Philosophy in England in the Seventeenth Century*, Vol. II. (Edinburgh, 1872).

CAMBRIDGESHIRE. An inland agricultural county of England (Map: England, G 4). Area, 820 square miles. About three-fourths of the county consists of arable land, meadow, and pasture, the rest being fens. The chief rivers are the Ouse, which crosses the middle of the county from west to east, with its tributary the Cam, the Nene, which borders the county on the north, and the Lark. These are all navigable to a certain extent. County town, Cambridge. Population, in 1891, 188,961; in 1901, 190,700. Consult Conybeare, *History of Cambridgeshire* (London, 1897).

CAMBRONNE, kăn'brŏn', Pierre Jacques Etienne, Count of (1770-1842). A brave and blunt soldier of Napoleon, most widely known, perhaps, for a phrase he never uttered. He was born at Saint-Sébastien, near Nantes, fought in the Vendée in 1792, distinguished himself at Zurich in 1799, and participated in the campaigns of the Empire between 1806 and 1813.

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He went with Napoleon to Elba, and at Waterloo led a division of the Old Guard. There, after fighting like a madman, he is reported to have cried in answer to General Halkett's demand for his surrender, *La garde meurt et ne se rend pas* (The Guard dies, but never surrenders). Cambronne did not say this, however, and he did surrender. Severely wounded, he was taken to London, but bravely returned to stand his trial before a court martial, which acquitted him. In 1820 he was restored to his rank in the army.

CAM'BUSCAN'. The king of Tartary in Chaucer's *Squire's Tale*. The King of Arabia and India sends him a brazen horse, a mirror, a ring, and a sword of magic properties. He is the father of two sons, Algarsif and Camballo, and of a daughter, Canace. The story stops after a sort of prologue which promises adventures to come, more especially for Camballo and Canace; so the later history of Cambuscan and his presents is unknown.

CAMBYSES, kăm-bī'sēz, **I.** (Gk. Καμβύσης, Old Pers. Inscr. *Kambujiya*, of uncertain etymology). The father of Cyrus the Great (q.v.) and son and successor of Teispes in the line of Persian kings (Herod. vii. 11, and the Cyrus Cylinder).

CAMBYSES II. (? -B.C. 522). King of the united realm of the Medes and Persians from B.C. 529 to 522. He was the grandson of Cambyses I. and son of Cyrus the Great. Ascending the throne on the death of his father, he at once took the reins of government in his hands. His brother, Smerdis (Old Pers. *Bardiya*), was made viceroy of the eastern provinces of Iran. Cambyses's first and chief design was the conquest of Egypt. He invaded this country with his armies, and in B.C. 525 defeated Psammenitus, the King of Egypt, at Pelusium. Memphis, the capital, fell in the following year, B.C. 524, and Cambyses was soon master of the entire fertile valley of the Nile. Nubia was also subjugated, but not without great loss to his forces, and an attempt to conquer the Ethiopians proved a disastrous failure. An expedition likewise against Carthage had to be abandoned because the Phœnicians refused to lend their naval power. It was now that Cambyses received news that the throne of Persia had been seized, during his absence, by a Magian priest Gaumata, the Pseudo-Smerdis. The usurper impersonated Bardiya, or Smerdis, Cambyses's brother, who had been assassinated, though the people did not know it, at the instigation of Cambyses himself. Startled by this bold impersonation of one whom he believed to be dead, the guilty and crime-laden Cambyses hastened to retrace his steps to Persia, but died on the way, B.C. 522, at Agbatana, which Herodotus (iii. 62-64) calls a city of Syria, but Josephus names Damascus. The oracle of Buto had prophesied he would die at Agbatana, but Cambyses always supposed the Median Ecbatana to be meant by this. In certain respects, the accounts of Herodotus (iii. 64) and Ctesias differ as to the manner of his death, but both attribute it to an accidental self-inflicted wound. In the great Behistun inscription (i. 43) Darius says that Cambyses died by a death self-inflicted, but the word *uvā-maršiyuš*, lit. 'self-death,' seems rather, though not necessarily, to imply suicide. Regarding the character of Cambyses, if we follow Herodotus, his behavior in Egypt was little short of that of a madman. His cruelties and sacrilegious acts were atrocious. He is said to have violated the tombs of the Egyptians, and even to have put some of their leading men to death. In an outrageous manner he stabbed the sacred bull of Apis so that it died, and he caused the ministering priests to be scourged (Hdt. iii. 29). But it must be added that this account is not easy to reconcile with an existing stele on which Cambyses is portrayed as giving an honorable burial to the dead god Apis. On the whole, however, there can be no doubt that he was a dissolute and inhuman ruler. See CYRUS; DARIUS; MEDIA; PERSIA.

CAMBYSES, KING OF PERSIA. A tragedy by Thomas Preston, published in London in 1569 by John Allde. An undated edition was later brought out by Edward Allde. It has been reprinted by Hawkins and Dodsley. It is important as marking the transition between the morality and the historical drama. It is written in Alexandrine rhymes, occasionally dropping into heroics in the comedy passages. The melodramatic treatment of its subject is probably referred to by Shakespeare in his now proverbial expression of "speaking in King Cambyses's vein."

CAM'DEN. A town and county-seat of Wilcox County, Ala., 62 miles west by south of Montgomery, on the Louisville and Nashville Railroad. It is in the fertile 'Black Belt' of Alabama. Population, in 1890, 545; in 1900, 478.

CAMDEN. A city and county-seat of Ouachita County, Ark., 115 miles south by west of Little Rock, on the Ouachita River, and on the Saint Louis Southwestern and the Saint Louis, Iron Mountain and Southern railroads (Map: Arkansas, C 4). It has a considerable river trade, shipping cotton, lumber, poultry, and live stock, and contains machine-shops, cotton-compress, cottonseed-oil mill, lumber-mills, and wagon-works. Population, in 1890, 2571; in 1900, 2840.

CAMDEN. A city, port of entry, and county-seat of Camden County, N. J., on the Delaware River, opposite Philadelphia, with which it is connected by several lines of steam ferries (Map: New Jersey, B 4). It is an important railroad centre, the terminus of the Atlantic City and the West Jersey and Seashore railroads, and of divisions of the Pennsylvania Railroad. The city, which occupies an area of about 8 square miles on level ground, has regular streets, one-third of the total street mileage (180 miles) being paved, and, among the more notable features, contains a city hall and county buildings, a hospital, the West Jersey Orphanage, and several other benevolent institutions, good public schools, including an institution for manual training. Camden is an important shipping point; it has large market gardens in the suburban districts adjacent, and is noted for its manufacturing and shipbuilding interests. The leading manufactures are machinery, foundry products, cotton and woolen goods, oilcloth, lumber, chemicals, paints, steel pens, boots and shoes, etc. The government is vested in a mayor, and a unicameral city council, with the customary staff of administrative officials. Camden spends annually

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in maintenance and operation about $735,000; the main items of expenditure being $180,000 for schools, $125,000 for interest on debt, $100,000 for the police department, $75,000 for the fire department, $70,000 for municipal lighting, and $70,000 for the water-works. The assessed valuation of property, real and personal, is about $29,000,000, and the bonded debt $2,500,000. The sewerage system comprises about 100 miles of mains, and the water-works, including two plants built by the city in 1870 and 1889, at a total cost of $2,500,000, are under municipal operation, the system having 95 miles of mains. Population, in 1890, 58,313; in 1900, 75,935, including 10,100 persons of foreign birth and 5600 of negro descent. Camden, with a population of 1142, was chartered as a city in 1828; the Camden and Amboy Railroad, incorporated in 1833, gave the city its early importance as a railroad terminus. It was the home of Walt Whitman from 1873 until his death in 1892. Consult Fisler, *A Local History of Camden* (Camden, 1858).

CAMDEN. A town and county-seat of Kershaw County, S. C., 32 miles northeast of Columbia, on the Wateree River, which is navigable, and at the intersection of the Southern Railroad and Seaboard Air Line systems (Map: South Carolina, D 2). It is known as a winter resort, and has manufactures of cotton cloths and yarns, lumber-mills, and an extensive brick-making plant. Camden was settled in 1750 by a colony of Quakers from Ireland, and in 1791 was incorporated as a town. It is governed under a charter of 1890, which provides for a mayor, elected every two years, and a municipal council. Here, on August 16, 1780, an English force of 2000 under Lord Cornwallis defeated an American force of 3000 under General Gates, Baron DeKalb being mortally wounded in the engagement; and near here, at Hobkirk's Hill (see HOBKIRK'S HILL, BATTLE OF), an English force under General Rawdon repulsed an American force under General Greene on April 25, 1781. In 1825 a monument was erected to the memory of DeKalb, Lafayette laying the cornerstone. On February 25, 1865, General Sherman entered Camden and destroyed 2000 bales of cotton, a large quantity of tobacco, and a number of buildings. Population, in 1890, 3533; in 1900, 2441.

CAMDEN, CHARLES PRATT, first Earl of (1714-94). An English Chief Justice and Lord Chancellor, third son of Sir John Pratt, a Chief Justice under George I. He was born at Kensington and educated at Eton and Cambridge. In 1734 he became a fellow of his college, the next year obtained his B.A. degree, and in 1740 that of M.A. He studied law and was admitted to the bar in 1738. His prospects were discouraging until 1752, when he successfully defended a bookseller for libel on the House of Commons. In 1757 he was appointed Attorney-General, and in 1762 Chief Justice of the Common Pleas. He presided over the trial of Wilkes (q.v.) and declared the action of Government illegal, an opinion which, according with public sentiment, made him the most popular of judges. In 1765 he was created Baron Camden by the Rockingham administration, whose American policy and treatment of Wilkes, notwithstanding, he constantly opposed. The following year, although appointed Lord Chancellor, he did not abandon his principles; and four years after supported an amendment made by Chatham on the Government address, and resigned his office. Henceforth he was a political character. He took an active part against the ill-advised American policy pursued by Lord North, and in discussions on the law of libel, was called 'the maintainer of English constitutional liberty.' During the Revolutionary War he was very popular in the United States, and his memory is perpetuated by many counties, towns, and villages named after him. He was president of the council under Rockingham in 1782-83 and under Pitt from 1783 until his death, April 18, 1794. He was created Earl Camden and Viscount Bayham in 1786.

CAMDEN, WILLIAM (1551-1623). An antiquarian and historian, surnamed 'The British Pausanias.' He was born in London, where his father was a house-painter, May 2, 1551. His education began at Christ's Hospital, was completed at Saint Paul's School and at Oxford, where he obtained a B.A. degree in 1573. In 1575 he was appointed second master of Westminster School, and while discharging the duties of this office he undertook the work which made his name famous. His *Britannia*, written in elegant Latin, and giving an account of the British Isles from the earliest ages, was first published in 1586, and it at once brought him into communication with the learned men of his time. Before 1607 the work had passed through six editions, being enlarged and improved by the industry of the author. At first a comparatively small volume, it received much additional matter from other writers. The best-known edition is that of Edmund Gibson, in English, 2 vols., folio (1722). The latest translation is that of Gough and Nichols (2d ed., 1806). Bishop Nicholson said of this work that it was "the common sun whereat our modern writers have all lighted their little torches." In 1593 Camden was appointed head master of Westminster School; and in 1597 Clarencieux King-at-Arms, an appointment which gave him more time for the pursuit of his favorite studies. His other important works are: *Annals of the Reign of Elizabeth* (latest ed., 1717); *A Collection of Ancient English Historians* (6th ed., 1607); *An Account of the Monuments and Inscriptions in Westminster Abbey* (1600); and a *Narrative of the Gunpowder Plot* (1607). He died November 9, 1623, at Chiselhurst, in the house which afterwards belonged to Napoleon III., and was buried in Westminster Abbey. Before his death he endowed a professorship of history at Oxford.

CAMDEN SOCIETY. An English association organized in London in 1838, and named in honor of William Camden. Its object is the publication of historical and literary remains of antiquarian and general interest. The publications began in 1847. After 104 volumes had been issued, a new series began, which up to 1900 includes an additional 63 volumes.

CAMEL (OF., Lat. *camelus*, Gk. κάμηλος, *kamēlos*, from Heb. *gāmāl*, camel). A large desert-dwelling ruminant of two species, constituting the typical genus, Camelus, of the family Camelidæ. Both have been subjugated to man since prehistoric times, and neither is known or remembered in a wild state. The free camels which now roam in northern Turkestan, where they are hunted for their flesh, hides, and supe-

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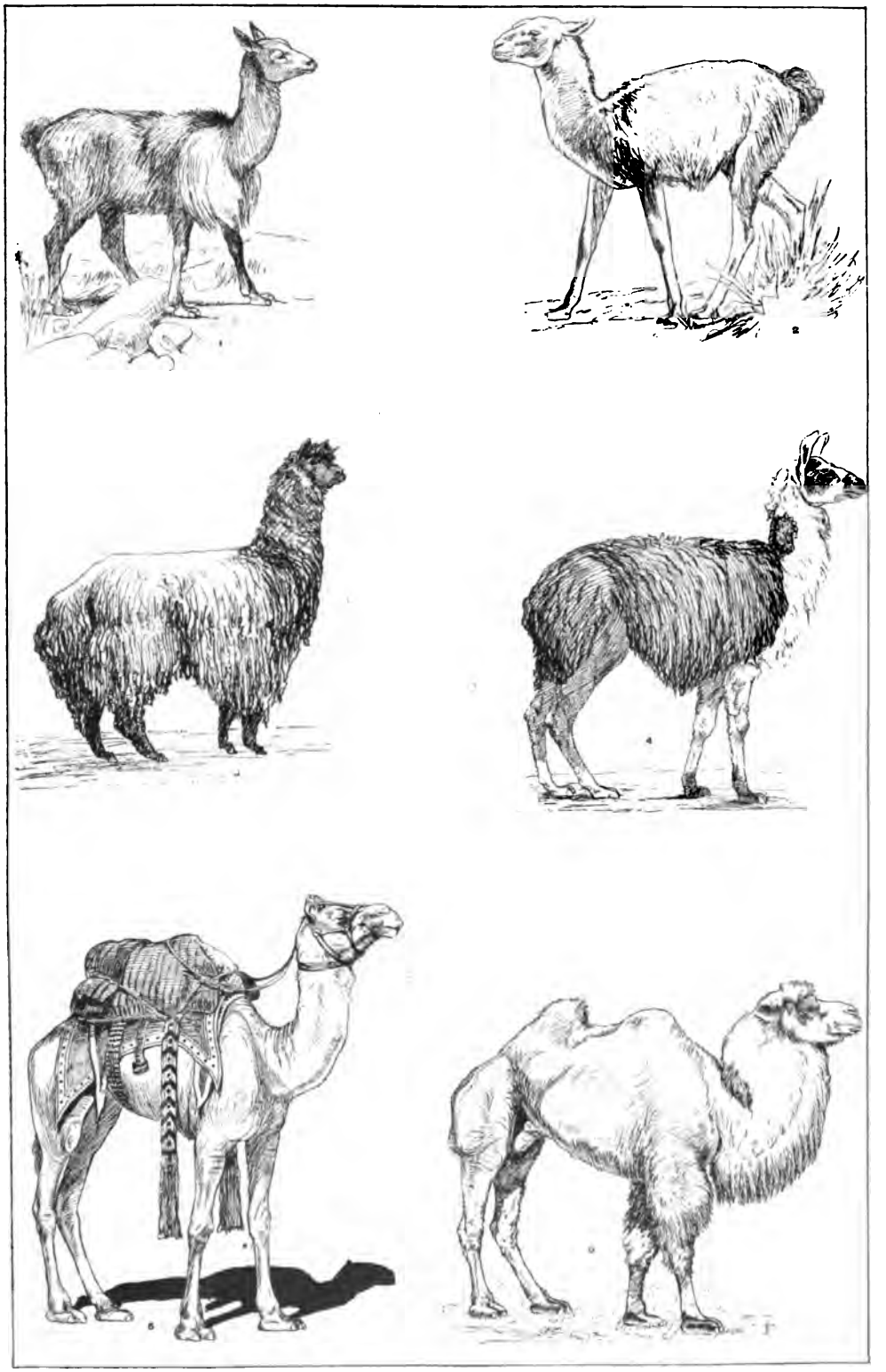
CAMELS AND LLAMAS



1. VICUNA (Lama vicunia).
2. GUANACO (Lama guanacus).
3. ALPACA (Lama pacos).
4. LLAMA (Lama glama).
5. ARABIAN CAMEL, Dromedary type.
6. BACTRIAN OR TWO-HUMPED CAMEL.

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rior wool, are descendants of the few which survived the vast sand-storms which, about 1700, overwhelmed the villages on the Gobi plateau and killed all the people. The two species of camel are the true or Arabian camel (*Camelus dromedarius*), having one hump, and the Bactrian camel (*Camelus Bactrianus*), with two humps. These humps are stores of flesh and fat, reabsorbed in support of the animal when overtaken by famine, as is so likely to happen.

The former is the common and widespread species, found from northwestern India and the lowlands of Afghanistan down to the extremity of Arabia east of the Red Sea and Somaliland to the south, and westward as far as the African deserts extend. They have also been introduced into Australia, Spain, Zanzibar, and the southwestern United States, but without permanent economic success. The United States Government spent much money and pains to acclimatize them as an army transport service in the dry southwestern regions, about 1857; the Civil War interrupted the arrangements, but the attempts made by private hands to utilize the animals were not profitable. Many were turned loose and remained wild along the Mexican border, but multiplied very little, and they are now supposed to be extinct. The British Government has made extensive use of them in its military operations in India and Upper Egypt, both as baggage animals, and in hauling artillery, and as mounts for a division of 'cavalry' known as the 'camel corps.' Consult Gleichen, *With the Camel Corps Up the Nile*, London, 1888, wherein many interesting facts as to the habits and qualifications of the animal are given.

What country was the original home of this species is uncertain; it seems more thoroughly adapted to a sandy region than the Bactrian, and is presumed to have had a more southerly habitat than the latter, probably inhabiting Arabia and perhaps the Sahara when first enslaved by primitive men. It is singularly adapted to subsistence in the desert by the structural qualities elsewhere mentioned (see CAMELIDÆ), and by its ability to bite off and consume the tough shrubbery and even thorny plants which alone grow there, and to endure the burning heat and flying sand. To this end it has acquired not only the thick and broad sole-pads, but the thick callosities on the joints of the legs and on the chest upon which it rests (in a kneeling posture) when it lies down; moreover, the nostrils may be closed against the flying dust, and the eyes are shaded and shielded by very long eyelashes. Its extremely acute sense of smell, especially for water, is another life-saving provision. All these qualities have combined to render it so highly serviceable to man in the great wastes that separate the habitable regions south and east of the Mediterranean, Black, and Caspian seas, that it is safe to say these could never have been colonized and have been the scenes of the momentous incidents and impulses they have contributed to civilization had it not been for the assistance of this ungainly and unlovely creature. "I can speak from experience," remarks Captain Wellby (*'Twixt Sirdar and Menelik*, New York, 1901), "of this marvelous endurance of camels, for on a previous trip in Somaliland I once marched with a string of camels for eleven days, during which time none of them had a drop [of water]."

The Bactrian camel is better adapted, by its smaller size and heavier build, harder and more cloven feet, longer and finer wool, and other qualities, to a rocky and cooler region, and its home is central Asia, from northern Turkestan to Mongolia. Its endurance is equally remarkable, under different circumstances, with that of its southern congener, for it withstands the awful climate of the Tibetan plateau, where the temperature rises to 140° F. in summer and sinks to Arctic cold in winter; it tramps with burdens of tea or hauling wagons or sledges over the plains, and often through wintry snows, from Peking to Lake Baikal, and carries heavy loads over the lofty passes of the Hindu Kush, and across the flinty plains of Afghanistan, and thence to Persia. It is this ability to endure climatic extremes, variety of fare, and famine, which has perpetuated the camel through a longer generic history than that of almost any other animal, and has made it of so much service to mankind in regions unendurable by most cattle or horses.

The Arabian camel carries twice the load of a mule. The Bactrian camel is sometimes loaded with 1000 or even 1500 pounds weight, although not generally with so much. A caravan sometimes contains 1000, sometimes even 4000 or 5000 camels. The supply of food carried with the caravan for the use of the camels is very scanty; a few beans, dates, carob-pods, or the like, are all that they receive after a long day's march, when there is no herbage on which they may browse. The pace of the loaded camel is steady and uniform, but slow—about 2½ miles per hour. Some of the slight dromedaries, however, can carry a rider more than 100 miles in a day. The motion of the camel is peculiar, jolting the rider in a manner extremely disagreeable to those who are unaccustomed to it; both the feet on the same side being successively raised, so that one side is thrown forward, and then the other.

The patience of the camel has been celebrated by some authors, but this is mainly indifference and stupidity. It submits because it knows no better, cares nothing for its master, is influenced to a very slight degree by either kindness or harshness, is unhappy when alone, and always untrustworthy; is cowardly, and, at the rutting season, is subject to sudden and violent fits of rage, when it uses its teeth with terrible effect.

The camel produces only one young one at a time, or rarely two. It lives thirty or forty years. During the long ages it has been subjected (the word 'domesticated' hardly applies) to man, almost as many breeds have been created as in the case of the rose, and there is a vast difference between those bred as baggage animals and those reared for the saddle; the latter, light and swift, often capable of traversing 100 miles of desert a day, are 'dromedaries,' whether one-humped or two-humped.

The great value of the camel to the desert people is due to its manifold usefulness, for besides its utility as a carrier of both man and his burden, and as a means of trade, its flesh is good food, and the milk is excellent; from the hair, cloth, ropes, etc., are made; the hide is serviceable; the bones (in eastern Asia) serve as ivory; and the dung is in some regions almost the sole dependence of the nomads for fuel. The animal is nevertheless steadily decreasing in im-

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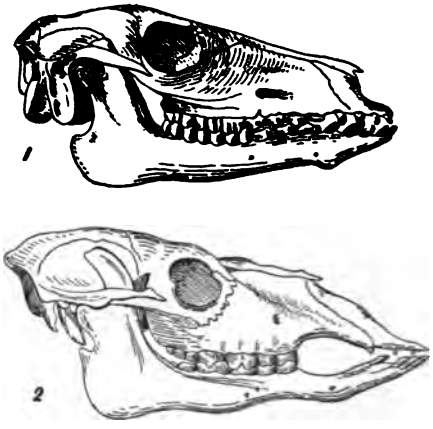
portance by the advance of railways, the opening of wagon roads, and other supersessions of its service, even in the remoter parts of its arid domain. See Plate of CAMELS and LLAMAS.

CAMEL (from *camel*, as carrying heavy burdens). A water-tight, box-like contrivance designed for lifting ships, sunken weights, etc. The use of wooden floats for lightening the draught of a ship to permit her to pass over a shoal or bar is very old, but the invention of hollow floats, or camels, is ascribed to the Dutch, and their first use is said to have been about 1688. The ordinary camel is a simple rectangular box float, and is much used in navy-yards and private shipbuilding establishments. The camels designed by the Dutch were sometimes a hundred feet or more in length, 20 feet broad, and made to fit the sides of the ship; they were allowed to fill with water, hauled up close to the vessel's sides, and secured in place by chains and lashings. When the ship reached the shoal or bar the water was pumped out of the camels, and the increased buoyancy thus obtained raised the ship enough to materially decrease her draught. Modern camels which are used in wreck-raising are generally built of steel and fitted with machinery for working the chains which support the wreck or attach it to the camel.

CAMEL-BIRD. The ostrich; a book-name.

CAMEL CRICKET, or CAMEL LOCUST. A mantis (q.v.).

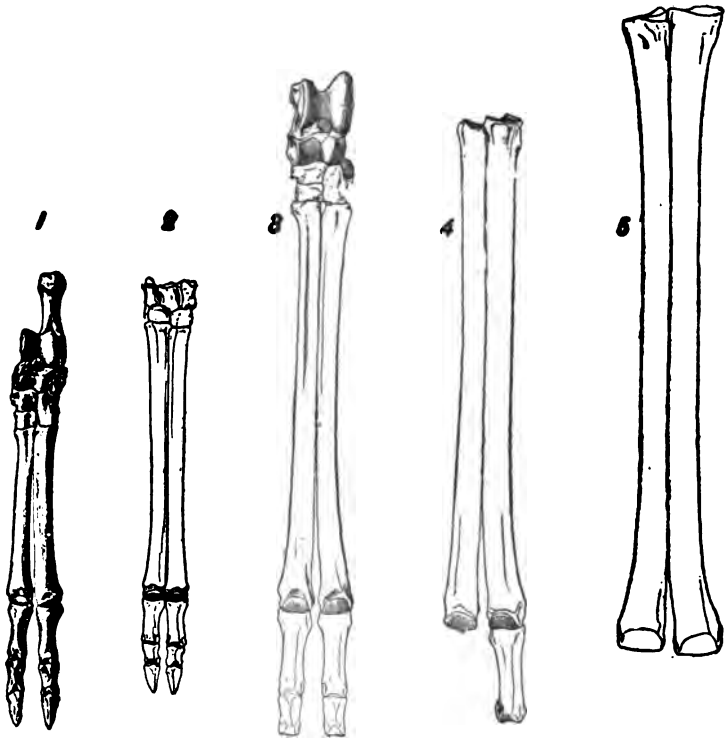
CAMELIDÆ (Neo-Lat., from Gk. *κάμηλος*, *kamēlos*, camel). The camel family, constituting a section of the ruminants termed Tylopoda, in reference to the character of the feet. This family is composed of two genera—*Camelus*, with



SKULLS OF CAMELS.

1. Poëbrotherium, an extinct primitive type. 2. Existing camel, showing change in dentition.

two species (see CAMEL), and *Llama*, the American llamas, considered by some naturalists one species, by others four. (See LLAMA.) These animals agree in peculiarities of structure, which separate them from other ruminants, mainly as follows: Though a full set of incisor teeth are present in the young, only the outermost continue through life as isolated laniariform teeth; canines are present in both jaws, and the molars are solenodont in type. The skeleton has many peculiarities, of which a striking one is the excessive comparative length of the thigh-bone, and the detachment of the hind leg from the body. The limbs are long, the ankle-bones peculiar, and all traces of phalanges are lost, except the third and fourth. These are not incased in matched hoofs, like other artiodactyls, but the foot consists of two elongated toes, each tipped with a small, nail-like hoof, the feet resting not upon the hoofs, but upon elastic pads or cushions under the toes. In the camels the toes are united by a common sole, thus resting upon one extended pad, instead of having each a separate one, as in the llama group, the broader expanse of the foot enabling the animals of the one genus more easily to traverse the loose sand of the desert, while the narrow



FEET OF FOSSIL CAMELS.

Bones of the feet, showing progressive development toward increase of size, union of metapodials, etc.: 1. Protylopus (Eocene); 2. Poëbrotherium (Oligocene); 3. Gomphotherium Sternbergi (John Day Beds); 4. Gomphotherium cameloides (Loup Fork Beds); 5. Procamelus (Loup Fork Beds). (After Wortman.)

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1. CAPER PLANT (Capparis spinosa), showing edible buds.
2. CANARY SEED GRASS (Phalaris Canariensis).
3. BLUEBELLS (Campanula rotundifolia).
4. CARAWAY SEED (Carum caria).
5. CAMELLIAS (Camellia Japonica), single and double.
6. CANNAS OR INDIAN SHOT (Canna Indica var.).

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form and separation of the toes in the other is suited to the uneven surface of rocky heights. The head is long, without any horns or antlers, the lips extended and mobile, the neck of unusual length; the blood-corpuscles are oval instead of circular, as in all other mammals, and the digestive organs are characterized by a remarkable peculiarity in the structure of the stomach. "Though these animals ruminate," to quote Flower and Lydekker, "The . . . interior of the rumen or paunch (see RUMINANT) has no villi on its surface, and there is no distinct psalterium or manyplies. Both the first and second compartments are remarkable for the presence of a number of pouches or cells in their walls, with muscular septa, and a sphincter-like arrangement of their orifices, by which they can be shut off from the rest of the cavity, and into which the fluid portion only of the contents of the stomach is allowed to enter." Such is the celebrated arrangement by which the camel stores in its stomach more water than it can immediately use, and by gradually using it is able to make far longer journeys across arid regions than otherwise would be possible. This has customarily been regarded as a very striking special provision for the needs of the camel of the desert; but it is equally characteristic of the llamas, which inhabit well-watered regions, and has evidently descended to both from a remote common ancestry, regardless of present environments. See ALIMENTARY SYSTEM.

The structural evolution of the camel recalls that of the horse. (See EQUIDÆ.) In the oldest Tertiary rocks of the ancient lake region of the Rocky Mountains, at the dawn of the Eocene, have been found diminutive remains suggesting this type, and in the Upper Eocene fossil skeletons undoubtedly cameloid. These belong to an animal (Prototylops) hardly larger than a jack-rabbit, yet camel-like in many particulars. It had four distinct toes, of which the third and fourth were most useful, while the lateral second and fifth were smaller; the metapodial bones were disconnected, and there was no space between the bunodont molars and the front teeth, where the canines and incisors were alike. By changes that went on analogous to those in other ungulates, there is found in subsequent cameloid forms increase in size, and a constant tendency toward acquiring the dentition and pedal anatomy characterizing modern forms. The next advanced form is greater in size, and the lateral toes, no longer useful, hang to the side of the foot above the ground like a deer's. A steady increase of size goes through the ascending formations of the Miocene, until we reach Procamelus, at the top of the Miocene (Loup Fork beds of Wyoming), which was as big as a sheep and very llama-like, with teeth nearly of modern type and the metapodial bones firmly united when fully adult. During the Miocene the western American plateau seems to have been an arid desert, and under such conditions were developed the large, splayed feet, bereft of the useless side toes, the great sole-pads, and the pouched stomach that characterize the race. At the close of the Miocene, however, there came about a steady change toward a warmer, moister climate, inducing forest growth, which put an end to camel life in North America. Meanwhile they had migrated into South America, where fossil remains of great size are found, and where the family still survives, in the modified and perhaps degenerate forms of the llamas; and also northwestward to Siberia, and thence into Central Asia, where their remains are found in the Pliocene rocks of India, but not earlier. Here the conditions were favorable, and the modern camels seem to have developed. It thus appears that North America was the original home of the Camelidæ, and that they "were derived from pig-like animals quite independently of the true ruminants." For particulars as to American fossil camels, consult Wortman, *Bulletin American Museum Natural History*, X. (New York, 1898).

CAM'ELI'NA (Neo-Lat., probably from Gk. χαμαί, *chamai*, on the ground + λίνον, *linon*, flax). A genus of cruciferous plants embracing about a dozen species, most of which are European. *Camelina sativa* is cultivated in Europe and Asia for the oil contained in the seed. The stalks contain a kind of fibre, which is sometimes used for making brooms. The plant has become introduced into the United States, where it is known as false flax, or gold of pleasure, and is considered a bad weed. See GOLD OF PLEASURE.

CAMEL'LIA (Neo-Lat., named after Joseph Kamel, a Moravian traveler of the Seventeenth Century, who first described the *Camellia japonica*). A genus of plants of the natural order Ternstrœmiaceæ, nearly hardy evergreen shrubs or trees, and natives of China, Japan, and the north of India. Camellias are now extensively cultivated as greenhouse shrubs in Europe and in the United States. Many varieties are in cultivation. The best known and most esteemed is *Camellia japonica*, a greenhouse shrub. Its leaves are ovate-elliptical, almost acuminate and serrate shining; the flowers are without stalks, mostly solitary, large, and rose-like. It is a native of Japan, and there and in China it has been carefully cultivated from time immemorial. In its wild state it has red flowers, and the red single camellia is much used by gardeners as a stock on which to graft the fine varieties, the flowers of which are generally double. The colors of the cultivated forms are various, including red, white, and yellow, and the varieties also differ much in the form and position of the petals. The flowering time is in autumn, winter, and spring. Camellias grow best in cool houses. Free access of air is of great importance, and water must be given very liberally, yet with such caution that the soil may never remain soaked after the immediate wants of the plant are supplied. The proper soil for camellias is a loose black mold; a little sand and peat are often advantageously mixed with loam to form it. Camellias are often propagated by cuttings, or layers, but generally by grafting or inarching. The single camellia is also propagated by seed, and in this way the best stocks for grafting are procured. Of the other species of camellia, the most hardy, and one of the most beautiful, is *Camellia reticulata*. The seeds of certain varieties, as *Camellia oleifera* and *drupifera*, are used in China for the production of an olive-like oil. The true tea-plant is a close ally of the camellia. See TEA.

CAMEL'OPARD. See GIRAFFE.

CAMEL'OPAR'DALIS (Gk. καμηλοπάρδαλις, *kamēlopardalis*, giraffe, literally camel-pard, from

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κάμηλος, *kamēlos*, camel + πάρδαλις, *pardalis*, pard). A constellation defined by Hevelius, between the pole-star, Auriga, Cassiopeia, and the head of Ursa Major, which consists of stars of moderate magnitudes, forming, in imagination, the shape of a giraffe.

CAM'ELOT, or **CALBURY**, kăl'bĕr-ĭ. A steep hill in the parish of Queen's Camel, Somersetshire, England, 5 miles from Ilchester (Map: England, D 5), identified by tradition with Camelot, one of the capitals of the legendary King Arthur (q.v.). Others state that Camelot was the name given in the mediæval romances to the city which grew up out of the permanent quarters of the second Augustan legion at Caerleon-upon-Usk.

CAMELOT. The legendary site of King Arthur's castle and court. It has been variously located in Somersetshire, at or near Winchester, Hampshire, and in Wales. Shakespeare favored the first, Tennyson and Capell the second, and Caxton the third site. The monks of Glastonbury were chiefly responsible for the 'Somerset' theory, which they maintained, especially in the Fourteenth Century, for the purpose of attracting pilgrims and thus enriching their abbey. It is often mentioned in English literature, notably in *King Lear* and *The Lady of Shalott*.

CAMEL'S HAIR. A fabric woven from the hair or wool of the camel, by Persians and Arabs, for tents and clothing. In early ages rough garments of this stuff were worn by monks and priests by way of penance. It is now imported into Europe and used extensively in the manufacture of dress materials, whose chief characteristic is a rough and hairy surface. Cow's hair is sometimes used as a substitute in the cheaper grades of so-called camel's-hair goods. A fine grade of camel's hair is used for artists' brushes.

CAMEN, kä'men, or **KAMEN.** A town in the Province of Westphalia, Germany, on the Seeseke, 10 miles southwest of Hamm. It is a thriving industrial centre, with coal-mines, paper-mills, and iron-foundries. Population, in 1900, 9888.

CAME'NÆ (Lat., Old Lat. *casmenæ*, muses, prophetesses, connected with *carmen*, song). In Roman mythology, nymphs possessing the power of prophecy, as Carnenta and Egeria. They had a sacred grove in Rome, just outside the Porta Capena. (See EGERIA.) The Roman poets often apply the name *Camenæ* to the nine Muses of Grecian myth.

CAMENZ, kä'mĕnts. See KAMENZ.

CAMEO (It. *cammeo*, Fr. *camée*, Med. Lat. *cammœus*). Gems cut in relief are called cameos, in opposition to those that are hollowed out so as to yield a raised impression, which are called *intaglios*. The term cameo, however, is applied more especially to those diminutive pieces of sculpture which are prepared from precious stones having two strata or layers of different colors, the undermost of which is left to form the background, the object to be represented being cut in the upper one. The stone generally used for this purpose by the ancients was the variegated sardonyx.

True cameos were probably not made before the Third Century B.C., though in very early times we find the backs of seals decorated with figures in relief, so especially in the *scarabæi*, seals decorated on the back with the sacred beetle of Egypt. As precious stones were used in the Orient and among the Greeks after the conquests of Alexander for many decorative purposes, the Greek artistic sense sought to raise this decoration to a higher plane, and this seems to have led to the carving of the gems into reliefs. At this period cameos were very extensively used, not only as personal ornaments, but in cups, vases, candelabra, and other objects of domestic luxury. Pateræ and other vessels were frequently worked out of a single stone, upon which were exhibited a whole series of figures of the most exquisite workmanship. Many of the antique cameos which have been preserved are wonderfully beautiful, both in design and execution. Of the Alexandrian cameos, probably the finest is the "Tazza Farnese," a shallow dish cut from a single sardonyx, and now in Naples. Other very fine specimens of the early period are the Gonzaga cameo in Saint Petersburg and a companion in Vienna, containing the portraits in profile of a man and a woman. They are commonly said to be portraits of Ptolemy II. and his Queen, Arsinoë, but are quite as probably Alexander the Great and Olympias (so Furtwängler). Of cameos of the Roman time, many fine specimens are to be found in the Continental museums. Especially noteworthy are the Gemma Augustea in Vienna, and the large sardonyx in Paris; both show Roman emperors, Augustus and Tiberius, triumphing over barbarians. Very celebrated is the "Cupid and Psyche" formerly in the Marlborough collection, now in the Boston Museum of Fine Arts, by Tryphon, who is supposed to have lived in the time of Augustus. The stones on which many of these cameos are cut are of surprising, and, in modern times, unequaled size and perfection. Cameos do not seem to have been made in mediæval times; but the art revived in Italy, under the auspices of the Medici, and the production of cameos, both in *pietra dura* and in shell, has there become a branch of art manufacture of considerable importance. Impressions from antique cameos in glass, sulphur, porcelain, and other materials are produced in many places, and, for artistic purposes, possess all the value of the originals.

The manufacture of cameos from artificial substances was not unknown to the ancients. One of the most beautiful specimens of an imitation of cameo in glass is the famous Barberini or Portland vase, now in the British Museum. The ground is blue, the figures, which are in low relief, being of a delicate, half-transparent white. (See PORTLAND VASE.) Another example is a vase in Naples, representing Cupids in a vineyard. Many fragments of the same kind of manufacture exist in other cabinets. See: C. Davenport, *Cameos* (London, 1900); and especially Furtwängler, *Die antiken Gemmen* (Leipzig and Berlin, 1900).

A shell cameo is a cutting in relief on a precious stone or a shell. It is opposed in meaning to intaglio, which signifies a cutting into the stone or shell. In intaglio work, furthermore, only gems of a uniform color are used, while in cameo engraving or cutting it is desirable to choose such stones or shells as possess layers of varying colors, such as onyx, agate, or tropical sea-shells. These differing tints are

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skillfully utilized by intelligent engravers, so that at different depths of the cutting very beautiful and effective gradations of color are obtained. Shell, perhaps, gives the most delicate results, owing to the nearness of the color to that of flesh, and the general use made of the human figure and head as subjects for cameo engraving. The art is one of great antiquity, and the engraving of precious stones and of shells in distinct bands of color has been practiced since about B.C. 150. Probably stone and shell, more or less engraved as ornament, talisman, and seal, are of still more remote times.

Inasmuch as Egypt was the birthplace, as it were, of belief in amulets, charms, and phylacteries of all kinds, it naturally came to pass that it was the earliest country to develop and to encourage the production of these emblems which, for the individual, possessed a magical and religious significance. From the time of the dynasties of the first Pharaohs to the period of the domination of the Romans, the inhabitants of the valley of the Nile, men and women, all wore about the neck, on the finger, or hung somewhere on their garments, cut or engraved gems of a talismanic character, which also served, in some sort, as a personal seal. It is safe to say that no country of ancient times has produced in such profusion precious stones in relief and in intaglio. It was in the Greek and Roman period that the cameo reached its perfection. The century of Scopas, Praxiteles, Lysippus, and Apelles produced an artist in gems whom all antiquity praises, but from whom there has not come down to us a single signed work. This artist is Pyrgoteles. Pliny and many others speak of him as the ablest engraver of all time, and place him in the same rank as the abovementioned sculptors and painters. Pyrgoteles probably engraved several portraits of Alexander in cameo and intaglio, though none can be authenticated. Although cameo is sculpture in miniature, we see by this that it engaged the talents of really great artists, and became, indeed, at its best, one of the fine arts. Among the largest examples of ancient cameo work is the Sainte Chapelle agate in Paris (13 x 11 inches), representing the apotheosis of Augustus, and the Vienna onyx, an allegorical representation of the coronation of Augustus. These surpass, in size and beauty of execution, the best of modern productions in this art.

BIBLIOGRAPHY. Agostini, *Gemmæ et Sculpturæ antique depictæ ab L. Augustino* (Paris, 1685); Zanetti, *Le gemme antiche* (Venice, 1750); Marsh, *Cameo Cutting* (London, 1891); Thompson, "On the Working of Shell Cameos," in *Art Journal* (London, 1898); Davenport, *Cameos* (London, 1900).

CAMERA LU'CIDA (Lat., light chamber). A device fitted to the eyepiece of a compound microscope to enable the observer to trace upon a sheet of paper the magnified image of the object as seen. It is constructed in various forms, the simplest of which is a small plate of glass attached to the eyepiece at an angle of 45 degrees, as shown in Fig. 1. A portion of a slide or cover glass fixed to the eyepiece with wax can be employed for this purpose. In using the camera lucida, the tube of the microscope is placed in a nearly horizontal position, and a sheet of paper laid on the table beneath the eyepiece. The rays coming through the eyepiece are reflected into the eye from the glass, though coming apparently from the paper below, where an enlarged image of the object is seen. The out-

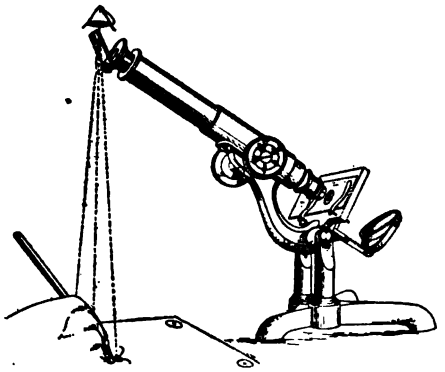

FIG. 1. SIMPLE CAMERA LUCIDA.

line of the image can readily be traced with a pencil, and in this way an accurate representation of the object can be quickly made. Instead of the simple mirror of glass, Sömmering employed a flat, circular piece of polished steel or speculum metal, whose diameter was somewhat smaller than that of the pupil of the eye. The rays are reflected vertically, and enter the eye, as do also those from the paper which come to the eye, after passing by the edges of the mirror. A prism, so constructed that total reflection occurs one or more times, is often employed, and the arrangement of Wollaston, which is frequently used, is illustrated in the figures and described below. It consists of a small quadrilateral prism of glass, which Fig. 2 shows in

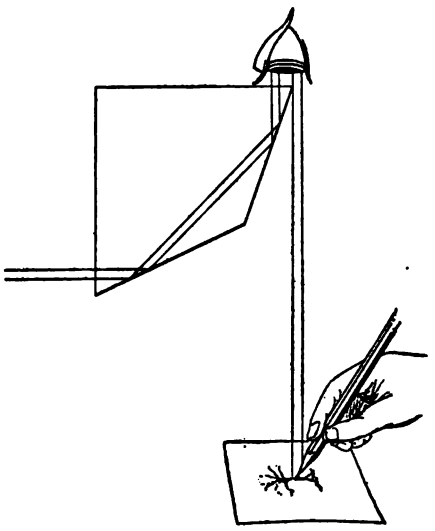

FIG. 2. WOLLASTON'S CAMERA LUCIDA.

perpendicular section, held in a brass frame, which is fitted in front of the eyepiece by a suitable mounting, or attached to an upright rod, having at its lower end a screw-clamp, to fix it to the edge of a table. The prism, being at the height of about a foot from the table, has its upper face horizontal. Two of its faces, as in

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the figure, are at right angles; the contiguous faces make respectively with them angles of 67½°, so that the remaining obtuse angle contains 135°. Rays coming from an object and falling nearly perpendicularly on the first surface enter the prism, and undergo total reflection at the contiguous surface; they then fall at the same angle on the next surface, and are totally reflected again; finally, they emerge nearly perpendicular to the remaining surface. An eye, as in the figure, then receives the emergent pencil through one part of the pupil, so that an image of the object is seen projected upon a sheet of paper upon the table. The rays from the paper and pencil passing the edge of the prism enter the other part of the pupil; and the pencil and image being seen together upon the paper, a sketch of the latter can be made. There is, however, a practical difficulty—the image and the drawing-pencil are at distances sensibly different from the eye, and so cannot be seen together distinctly at the same time. To obviate this, a plate of metal, with a small aperture, as an eye-hole, is placed at the edge under the eye, so that the rays through the prism, and those from the drawing-pencil, which both pass through the eye-hole, form only very small pencils. A convex lens is also sometimes employed for this purpose. The form of camera lucida devised by Abbe is also used with the microscope. It consists of two right-angle prisms with their hypothenusal faces placed together and a reflecting

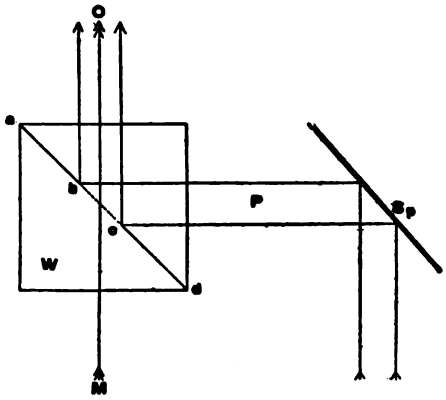

FIG. 3. ABBE'S CAMERA LUCIDA.

mirror, as shown in Fig. 3. The separating surface, *ad*, is formed by a thin film of silver, except a circular space at *bc*, through which the direct rays from the microscope pass, as indicated by the arrow OM. To an eye placed at O, the rays from the paper are reflected by the mirror *Sp*, and again at the silver film between the prisms, so that the image of the magnified object appears on the paper. This arrangement is so mounted that it can readily be moved to and from the eyepiece. By using a finely divided glass scale as an object, we may obtain projected on the paper a magnified image of the divisions, so that the width of the intervening spaces can be measured. A ratio between the scale division, unmagnified and as they appear on the paper at a distance of 10 inches from the eye, will give the magnifying power of the microscope. Consult Carpenter, *The Microscope and its Revelations*, 8th ed., edited by Dallinger (Philadelphia, 1901).

CAMERA OBSCU'RA (Lat., dark chamber). A light-tight box, with a convex lens at one end and a screen at the other, on which an image is produced. This screen is generally a piece of

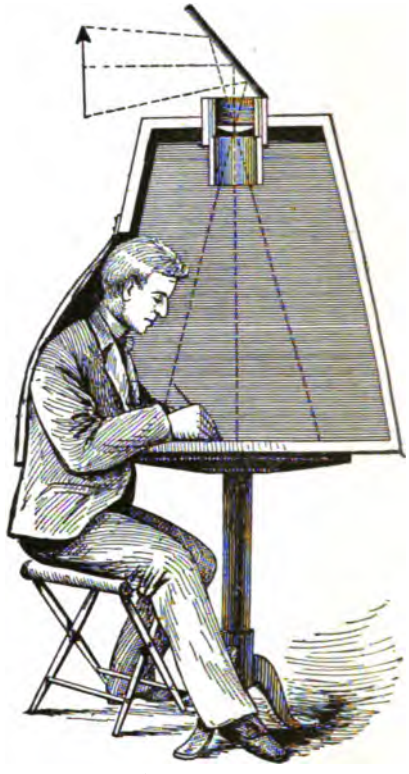

FIG. 1. CAMERA OBSCURA.

ground glass, or translucent paper, so that the image may be viewed from behind. The rays of light coming from an object pass through the lens, and when they reach the screen form an image which can be received on a sensitive plate and preserved in the form of a negative. If the screen is placed at the appropriate focal distance, a sharp representation of an object can be obtained. The human eye is a simple form of camera obscura, the crystalline lens and retina occupying the relative positions of lens and screen. The lens is not essential for the formation of an image, as with a small opening a picture is also produced. Such an image, while free from distortion, is not apt to be sharp, and a long exposure in making a negative is required.

The invention of the camera obscura is of importance on account of its being the prototype of the modern photographic camera, and is claimed for a number of celebrated men. The first of these is Roger Bacon, who lived in the Thirteenth Century, and after him comes Alberti, about two centuries later. Leonardo da Vinci, the famous painter and scientist, about the beginning of the Sixteenth Century, says that if you place yourself in an hermetically closed room, facing a building, landscape, or any other object directly lighted by the sun, and then cut

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a small circular hole in the shutter, images of the objects outside will be thrown on any surface facing the hole, and will be reversed. Such was the condition of the camera until the time of Cardan, about the middle of the Sixteenth Century, when he improved it by the addition of a convex lens at the aperture. The instrument in this form is described in his work *De Subtilitate*. In 1569 Giambattista della Porta, of Naples, to whom the invention is generally ascribed, in the seventh book of his work on Natural Magic, gives a detailed description of the apparatus, and in his instrument he placed an inclined mirror before the lens, with the result that the pictures were rendered brighter and erect, instead of inverted. Porta's camera obscura attracted general attention, and the instrument was soon provided for the country houses of the wealthy, being placed usually in a small conical building, with a white table or surface in the centre, on which the pictures were projected. A more modern form is shown in Fig. 1.

The camera obscura in the form of a box, with inclined mirror and a piece of ground glass or paper on which the images could be traced, was invented by Hooke in 1679. This instrument has since become familiar in the form of an optical toy, shown in diagram in Fig. 2,

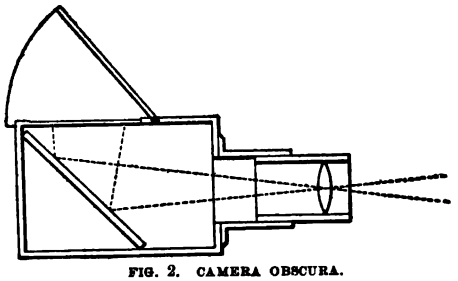

FIG. 2. CAMERA OBSCURA.

though the same principle has been made use of in certain pieces of scientific apparatus. The camera obscura in its simple form of lens and screen, suitably incased, was first used for photographic work by Humphry Davy in 1802, at a time when he was engaged in experiments with Wedgewood. After this, the camera obscura was used by all the early experimenters in photography (q.v.), and the instrument has since been developed and amplified to a remarkable degree. The photographic camera is con-

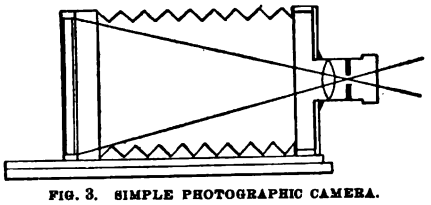

FIG. 3. SIMPLE PHOTOGRAPHIC CAMERA.

structed in an almost infinite variety of styles, depending in the main on the purpose for which it is to be used. In general, it consists of two boxes, joined by a flexible and light-proof material, such as a bellows of leather, rubber, or cloth, and susceptible of being moved toward or from each other, so that the distance between the lens and focal plane or position where the image is received can be varied. In one of these boxes, or on an upright board taking its place, the lens is mounted, and on the other there is a frame carrying a piece of ground glass, which, at the time of taking the picture, is removed and the sensitive plate or film substituted. This is contained in a holder so constructed that the sensitive surface occupies the same position as the original focusing glass.

The construction of a camera varies with the use or process for which it is intended. Thus, for out-of-door work portability and rapidity of adjustment are essential, whereas in a studio or laboratory rigidity and adaptability are demanded. A view camera does not require any considerable length of bed, or base, as the ground glass is never distant from the lens a much greater amount than the principal focus (q.v.), as the pictures are generally on a reduced scale. If a camera, however, is designed for copying or enlarging, then it must have a long bed, as the distance from the lens to the ground glass will be as many times greater than the distance between the original object and the lens as it is desired to enlarge the picture. Frequently in the case of hand-cameras the ground glass is omitted, and the proper focus is obtained by reference to a graduated scale on the bed, on which are marked the foci corresponding to different distances.

The use of films and increased ease of manipulation has made photography universally popular, and there are almost as many styles of cameras as there are individual tastes. See article PHOTOGRAPHY.

CAMERARIUS, JOACHIM (1500-74). A distinguished German classicist, born at Bamberg, April 12, 1500, of a family which originally bore the name Liebhard; for this Camerarius (Ger. *Kammermeister*) was substituted, since the office of chamberlain to the Prince-Bishop of Bamberg was hereditary in the family. At the age of thirteen, Camerarius entered the University of Leipzig, where the influence of Georg Held, with whom he was on intimate terms, led him to devote himself to the classics. He eventually was second only to Melanchthon (q.v.) in arousing an interest in classical study in Germany. In 1518 he began to teach Greek at Erfurt, but in 1521 he moved to Wittenberg, where he attached himself to Melanchthon. At the latter's recommendation, he was appointed to teach Greek and history in Nuremberg in 1526. Nine years later he was called to the University of Tübingen as professor of the Greek and Latin literatures. In 1541 he went to Leipzig, where he continued to lecture until his death, April 17, 1574. He contributed to the eminence of this university, not only by his teaching and writing, but also by the practical measures of university reform which he, with certain associates, was able to carry through. He was especially distinguished for his critical judgment, in which he surpassed Melanchthon, while his knowledge of the classics was not inferior to that of his friend, so that he deserves to be regarded as the greatest German classicist of his century. His works were very numerous. Besides biographical and theological writings, the most important are the following editions: *Homeric Poems*, with the so-called scholia of Didymus (Basel, 1541); *Greek Elegiac Poets* (Basel, 1550); *Theocritus*

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(Frankfurt, 1545); *Sophocles* (Basel, 1556); *Herodotus* (Basel, 1540 and 1557); *Thucydides*, with the scholia (Basel, 1540 and 1557); *Theophrastus* (Basel, 1541). He was also co-editor of the edition of *Galen*, published by Cratander (Basel, 1538, et seq.). After Camerarius's death, a number of Greek works and Latin translations were published by his relatives. Among the Latin authors edited by him should be named Quintilian with Commentary; Cicero (Basel, 1540); many separate works between 1542-1558; above all his edition of Plautus (Basel, 1552), for which he employed the so-called *Codex Vetus Camerarii* and the *Codex Decurtatus*, and thus for the first time secured a certain basis for the text. A full list of his works may be found in Pökel, *Philologisches Schriftstellerlexikon* (Leipzig, 1882). Consult Bursian, *Geschichte der klassischen Philologie in Deutschland* (Munich, 1883, pp. 185-90).

CAMERARIUS, Rudolf Jakob (1665-1721). A German botanist and physician, professor of medicine and director of the botanic garden at Tübingen. He was the first to recognize sexual differences in plants (1694).

CAMERINO, kä'mâ-rē'nô (Lat. *Camerinum*). A city in central Italy, with a bishopric dating from 252 and an archbishopric dating from 1787, between the Chienti and the Potenza, about 70 miles southwest of Ancona (Map: Italy, G 4). The cathedral, built in 1832, occupies the site of a temple of Jupiter. The town possesses a university, founded in 1727 (the smallest in Italy), and a library of 40,000 volumes. There are also the archiepiscopal palace, the ducal palace, the new palace, and a bronze statue of Sixtus V., erected in 1587. The chief industry is silk-growing. Population, in 1881, 12,000; in 1901, 12,542.

CAM'ERLEN'GO, or **CAM'ERLIN'GO** (It., chamberlain). The officer, generally a cardinal, who controls the finances and the secular interests of the Pope. During a vacancy in the Holy See, he is sole head in things temporal, and presides over the apostolic chamber or palace. In things spiritual, however, he is assisted by the other cardinals.

CAM'ERON, Archibald (c.1771-1836). An American clergyman, born in Scotland. He studied at Transylvania Seminary (later University), Lexington, Ky., was licensed to preach in 1795, ordained in 1796, and in the latter year was installed over the churches of Akron, Fox Run, and Big Spring. For many years the only Presbyterian clergyman in a wide extent of territory, he was occupied with itinerant labors until 1828, from which time he was pastor of the churches at Shelbyville and Mulberry. With the Rev. David Rice, he was a pioneer in the organization of the Presbyterian Church in Kentucky. Among his publications are: *The Faithful Steward* (1806); *An Appeal to the Scriptures* (1811); *A Defence of the Doctrines of Grace* (1816); and *A Reply to Some Arminian Questions on Divine Predestination* (1822).

CAMERON, Sir Charles (1841—). A Scotch journalist and politician, born in Dublin. He studied at Madras College, Saint Andrews, and Trinity College, Dublin, and at the medical schools of Paris, Berlin, and Vienna, and from 1864 to 1874 edited the *North British Daily Mail*. From 1874 to 1885 he was member of Parliament for Glasgow, from the subdivision of the constituency in 1885 until 1895 sat for the College division, and in 1897 was elected for the Bridgeton division. He introduced into the House the resolutions whose carriage effected the introduction of sixpenny telegrams, the previous minimum charge having been a shilling. He has published monographs on political and other subjects.

CAMERON, Sir Charles Alexander (1830—). An Irish physician and chemist. He was born in Dublin, and was educated in Dublin and Guernsey and in Germany. In 1862 he became public analyst for the city of Dublin, and in 1867 was appointed professor of hygiene and chemistry in the Royal College of Surgeons in Ireland. The following are a few of his valuable publications: *Elements of Agricultural Chemistry* (in collaboration with J. S. W. Johnston, 10th ed. 1897); *A Manual of Hygiene, Public and Private* (1874); *Lectures on the Preservation of Health* (1868); *The Prevention of Contagious Diseases* (1871).

CAMERON, Charles Duncan (? -1870). An English soldier and explorer. He participated in the Kaffir War of 1846-47, and afterwards in the Crimean War, and served with distinction at Kars, and afterwards, on special duty, at Trebizond. In 1860 he was appointed British consul in Abyssinia, but he did not assume the duties of this office until early in 1862. In June of this year he proceeded from his residence at Massowah to Gondar, for the purpose of delivering a letter and presents from Queen Victoria to King Theodore, but he was here thrown into prison by the King in 1864 for alleged interference in Abyssinian politics, and was held for two years, when he was surrendered to Rassan, the agent of the British Government. Soon afterwards he, with Rassan and other persons, was again imprisoned by King Theodore, and the party was released only when a British force advanced to their rescue. Cameron's account of his experiences was published in the *Parliamentary Printed Papers* (1868-69).

CAMERON, Donald (c.1695-1748). A Scottish chief, known as 'The Gentle Lochiel.' He was born at Achnacarrie, Lochiel, Inverness. He supported the young Pretender, Charles Edward, who landed in Scotland in 1745. When Lochiel suggested awaiting reinforcements from France, Charles taunted him into invasion of England. Lochiel took Edinburgh in September, 1745, distinguished himself at Prestonpans, marched as far south as Derby, returned to Scotland and captured Falkirk. Governed by his strict but just and humane discipline, his command gained honorable repute by their conduct and forbearance. He opposed the plan of the night attack on Cumberland's army at Culloden, where he was severely wounded. After vicissitudes, he escaped to France, where he was afterwards master of horse to 'the Young Chevalier.' He is the hero of Campbell's poem, *Lochiel's Warning*.

CAMERON, Sir Duncan Alexander (1808-88). An English soldier. He entered the army in 1825, became a colonel in 1854, and served with distinction in the Crimean War. He commanded a regiment at the Alma, and the Highland Brigade at Balaklava and at the siege of Sebastopol, where he took a prominent part

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in the assault upon the outworks. He commanded the troops in New Zealand in 1863, and in the following year was made a knight commander of the Order of the Bath, in recognition of his services against the Maoris. He became lieutenant-general in 1868 and general in 1874, and from 1868 to 1875 was governor of the Royal Military College at Sandhurst.

CAMERON, George Frederick (1854-85). A Canadian poet, born at New Glasgow, Nova Scotia. Educated at Queen's University, Kingston, he passed several years in the United States and then returned to Canada, becoming editor of the Kingston *News*. A master of rhythm and cadence, Cameron was the most intensely lyrical poet Canada has yet produced. His verse was praised by Swinburne, Tennyson, and Matthew Arnold. Consult: *Lyrics on Freedom, Love, and Death*, edited by C. J. Cameron (Boston, 1887); and Stedman, *Victorian Anthology* (New York, 1895).

CAMERON, James Donald (1833—). An American capitalist and politician, known as 'Don' Cameron. He was born in Harrisburg, Pa., the eldest son of Simon Cameron (q.v.); graduated at Princeton in 1862, and became engaged in banking and various industrial enterprises. As president of the Northern Central Railroad, he did great service to the Union cause during the Civil War. In 1876 he was appointed Secretary of War, and in March, 1877, succeeded his father as United States Senator. By successive reëlections he retained his seat until 1897, when he retired from public life. In 1880 he was chairman of the Republican National Committee.

CAMERON, John (1579-1625). A Scotch scholar and divine. He was born in Glasgow and was educated at the university of that city, where, in his twentieth year, he held an appointment as reader in Greek. In 1600 he set out to travel in France, where his ability and erudition secured for him a philosophical professorship in the University of Sedan. He afterwards acted as a Protestant clergyman in Bordeaux, and on the death of Gomarus (1618), was appointed to the divinity chair in the University of Saumur, an appointment he held until 1620, when, returning to Britain, he was appointed principal of the University of Glasgow (1622); but in less than a year he returned to Saumur; thence to Montauban, where he received a divinity professorship (1624). Here his opposition to the party who advocated a civil war made him many enemies, by one of whom he was stabbed in the street (May 13, 1625); and he died from the effects of the wound a few months later. He was considered one of the best scholars of his time; in biblical criticism he was inclined to be perverse; where there was a difficulty, he usually chose the opposite view to that held by other divines, especially Beza. His theological opinions were of a somewhat lax character, his works being said to be the foundation of Amyraut's doctrine of universal grace. So he is called the founder of the moderate Calvinistic school of Saumur. His collected works were published with a memoir by L. Cappel (Geneva, 1642).

CAMERON, Richard (? -1680). A Scotch minister, born in Falkland, Fife. He was founder of the sect of Cameronians, a term popularly applied to but declined by the Reformed Presbyterians. The son of a tradesman, he was an apt pupil at the village school, and while still a youth became schoolmaster and precentor. He espoused the cause of the itinerant field-preachers, and, possessing natural eloquence, was licensed and admitted to their numbers. In 1679 he joined banished friends in Holland, but returned in 1680, and with others strenuously resisted the measures that reinstated the Episcopal Church in Scotland, and proscribed the meetings for public worship of unauthorized religious bodies. He persisted in preaching in the fields and antagonized the Government by an attitude of defiance. In June, 1680, with twenty well-armed companions, he entered the town of Sanquhar, and in the market-place formally renounced allegiance to Charles II., for abuse of power, and declared war against him and his adherents. They retired to the hills between Nithsdale and Ayrshire, and succeeded in evading capture for a month, though a price of 5000 marks was set upon Cameron's head by the Government, and 3000 for the heads of the other leaders. They were surprised by a superior force in Aird's Moss, July 20, 1680, and after a brave fight Cameron was killed. His hands and head were cut off and fixed upon the Netherbow Port, Edinburgh. The followers who escaped were induced by the Edinburgh Convention of 1689 to assist in the revolution, and formed the nucleus of the renowned Cameronian regiment (q.v.) of the British Army. Consult Herkless, *Richard Cameron*, in Famous Scots Series (New York, 1896).

CAMERON, Simon (1799-1889). An American politician. He was born in Donegal, Pa., was a printer and then an editor, and early in life became prominent in State and national politics. In return for his services toward securing the renomination of Andrew Jackson, he obtained the Pennsylvania political patronage and valuable Government contracts, and thus acquired the beginnings of his great fortune. Largely through his efforts James Buchanan was elected to the United States Senate and later became President. In 1845 Mr. Cameron, now very wealthy, was elected by the Democrats to the United States Senate. He had always been a protectionist, and when his term expired (1849) he became a leader of the People's Party and fused it with the new Republican Party, and was again elected to the Senate in 1856. In 1860 he was a prominent candidate for the Presidency in the convention that nominated Lincoln, and in 1861 was by the latter appointed Secretary of War, though his appointment was bitterly opposed by many men of prominence. Soon after becoming a member of the Cabinet, he expressed himself in favor of arming fugitive slaves, a policy which President Lincoln then opposed, and much evidence being adduced in Congress to prove the corruption of his administration of the department, he was asked, in January, 1862, to resign his portfolio. From then until the following year he served as United States Minister to Russia. He rendered the country a valuable service in opposing the efforts of those who sought to defeat Lincoln's renomination. He was chosen United States Senator in 1866 and again in 1872. In the administration of President

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Hayes he strenuously opposed the executive policy of civil-service reform, and in 1877 he resigned his seat in order that his son, James Donald Cameron, might be elected in his place, thereby virtually keeping in the family the almost entire control of the Republican party in Pennsylvania.

CAMERON, VERNEY LOVETT (1844-94). An English explorer. He was born at Weymouth, Dorsetshire, entered the British Navy in 1857, and saw service on the east coast of Africa. In 1873 he was sent by the Royal Geographical Society on a second expedition to relieve Livingstone. In August Lieutenant Cameron met Livingstone's servants bearing their master's body to the coast. Cameron resolved to push on, and was the first European to cross tropical Africa from east to west, reaching the Atlantic in November, 1875. He found some of Livingstone's papers and a map, explored the southern half of Lake Tanganyika, and learned that the Lualaba was really the Upper Congo. On his return he received many honors, including a D.C.L. from Oxford. He was also chosen to membership in more than thirty scientific societies. He was promoted a commander in the navy. He published an account of his travels under the title *Across Africa* (2 vols., 1876, 2d ed., 1885). In 1878-79 he traveled in Asiatic Turkey and on his return published *Our Future Highway* (1880), advocating a railway from Tripoli to India. In 1882, in company with Sir Richard Burton, he visited the African Gold Coast in search of gold.

CAM'ERO'NIANS. Followers of John Cameron (q.v.), of Scotland; officially known as Reformed Presbyterians. (See PRESBYTERIAN CHURCHES.) They are moderate Calvinists, and assert that the will of man is determined only by the practical judgment of the mind; that the cause of men's doing good or evil proceeds from the knowledge that God infuses into them; and that God does not move the will physically, but only morally, by virtue of its dependence on the mind. This peculiar doctrine of grace and free will was adopted by many eminent teachers, who thought Calvin's doctrine too harsh.

CAMERONIANS (from Richard Cameron). A celebrated regiment of Scotch infantry in the British Army. In the British Army list it is described as "The Cameronians (Scottish Rifles)," Territorial District 26; depot or regimental permanent headquarters, Hamilton, N. B. The regiment consists of two battalions, each of about 1000 men of all ranks, and belongs to the oldest division of the British Army. In its origin it dates back to the time when the Covenanters, a religious body embracing a large majority of the Scottish people during the Seventeenth Century, were in arms for the defense of their faith, and in many instances went armed to their public meetings. The movement became so formidable that the Government pronounced illegal all armed assemblages for religious purposes. Richard Cameron, whose father, a small shop-keeper, had given him a good education, joined the ranks of the Nonconformists, and became so obnoxious to the authorities that he was compelled to take refuge in Holland. He returned in 1680, and shortly after the defeat of the Covenanters at Bothwell Bridge, in that year, was slain in a skirmish at Aird's Moss. The few troops he had been able to collect, and at whose head he was killed, formed the nucleus of the Cameronian regiment of to-day. Consult: Cunningham, *Church History of Scotland* (Edinburgh, 1883); and Burton, *History of Scotland* (London, 1873).

CAMEROON, kä'me-rōōn'. See KAMERUN.

CAMILING, kä'mē-lēng'. A town of Luzon, Philippines, in the Province of Tarlac, about 16 miles northwest of Tarlac. Population, 24,000.

CAMIL'LA. In Roman fable, a virgin wonderfully swift of foot, who aided Turnus against Æneas (Vergil, *Æneid*, vii. 803). She was said to be a daughter of Metabus, King of the Volscian town Privernum (Piperno).

CAMILLE, kä'mēl' (Lat. *Camilla*). (1) The heroine of Corneille's *Les Horaces*. Her lover is one of the Curiatii killed by her brothers, as in the old Roman legend on which the play is founded. When she denounces the act, and the patriotism which caused it, she is stabbed by her brother. (2) The heroine and title-character of the English adaptation of *La Dame aux camélias*. Camille is Marguerite Gautier in the original.

CAMIL'LO (Lat. *Camillus*). (1) A Sicilian lord who warns Polixenes of Leontes's designs against his life in Shakespeare's *Winter's Tale*. He escapes to Bohemia with the former monarch and remains there until the reconciliation of Polixenes and Leontes at the close of the piece. He is instrumental in bringing about the marriage of Florizel and Perdita. (2) The husband of 'the white devil' in Webster's play of the latter name. He meets his death through the agency of the Duke of Bracchiano, his wife's paramour. See COROMBONA, VITTORIA.

CAMIL'LUS and **CAMIL'LA** (Lat.). The names applied in ancient Rome to the boys and girls who shared in sacrificial ceremonies. If they were designed for the priesthood, it was necessary that their parents should be still living and free-born.

CAMILLUS (Lat.). A pseudonym used in journalistic writing by Fisher Ames. It was used also by Alexander Hamilton and Rufus King.

CAMILLUS, MARCUS FURIUS (B.C. ? c.365). A celebrated Roman patrician who first makes his appearance as consular tribune (B.C. 403). His military career was a series of unbroken successes, according to the accounts which have come down to us; but these accounts were shown by Niebuhr to possess a considerable admixture of mythological or poetic fiction. In 396 Camillus was made dictator, during the Veientine War, in which he mined and captured the city of Veii; but the proud splendor of his subsequent triumph offended the Roman populace, who were still further displeased when Camillus demanded a tithe of the spoils of Veii, in order to fulfill a vow made to Apollo, on condition of victory. In 394 Camillus was again elected consular tribune, and besieged Falerii, whose inhabitants, after bravely defending themselves, were led by a magnanimous act of Camillus to yield unconditionally. Afterwards, Camillus, being accused of peculation, and foreseeing certain condemnation, banished himself from Rome, 391, and lived in retirement at Ardea, until Brennus, at the head of his wild

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Gauls, had swept through Etruria, and captured and destroyed the whole of Rome except the Capitol. Camillus was now recalled and appointed dictator a second time. He achieved a decisive victory over the invaders, rebuilt Rome, and obtained new victories over the Volsci and others. In 386 he was elected dictator for the third time, but refused the office. In 381 Camillus was victorious in the war of Rome against Præneste and other Latin towns; and in 368 he was elected to his fourth dictatorship, but abdicated during the same year. In 367, when war broke out with the Gauls, Camillus, though 80 years old, accepted the dictatorship for the fifth time, defeated the barbarians near the site of Alba Longa, and made peace between patricians and plebeians. After this he erected near the Capitol a temple to Concord, and, having retired from public life, died about 365, of the plague, lamented by the whole Roman people.

CAMINATZIN, kä'-mē-nä-tsēn', or **CACUMAZIN** (? -1520). King of Tézcuco, nephew or cousin of Montezuma, and one of the leaders of the war party among the Mexicans after the capture of the King by the Spaniards. Caminatzin successfully opposed every effort of Cortes to make peace with the natives of the City of Mexico, but was finally taken captive through the instrumentality of Montezuma. He perished on the night of the evacuation of Mexico by the Spaniards (the *noche triste*), June 30, 1520.

CAMISARDS, kăm'ĭ-zärdz (Fr., from OF. *camise*, smock, less probably from Fr. *camisade*, attack by night). The active participants in the Protestant revolt of 1702 in the Cévennes, a mountainous region in Southern France, against the persecutions that followed the revocation of the Edict of Nantes. (See NANTES, EDICT OF.) The Camisards belonged to the Romance-speaking people of Gothic descent, who took part in the earliest movements toward religious reform. Calvin was warmly welcomed when he preached at Nîmes, and Montpellier became the chief centre for the instruction of Huguenot youth; but it was in the triangular mountainous plateau called Cévennes, and chiefly among the small farmers, the cloth and silk weavers, and the vine-dressers, that Protestantism was most widely diffused. The people were, and still are, very poor, but they are intelligent and pious, and add to the deep fervor of the Provençal character a gravity that is probably the result of the trials and sufferings of their ancestors. The Edict of Nantes of 1598 and the moderate and conciliatory policy of Richelieu had brought France relief from religious strife, and the Protestants were among the most industrious and useful of the population, but the Court of Louis XIV., in which Madame de Maintenon and the Jesuits had become supreme, would not long tolerate heresy in the kingdom. A policy of gradually destroying the privileges of the dissenters was begun. They were shut out from public offices and trade corporations; they were forbidden to marry with Roman Catholics, and the conversion of their children seven years old and upward was encouraged and almost enforced. In October, 1685, the Edict of Nantes was finally revoked. All dissenting churches were to be destroyed, religious meetings were forbidden under pain of imprisonment and confiscation of property; all pastors who would not stop preaching at once and change their faith were to be banished within fifteen days; exemption from taxes and increased salaries were promised to converted ministers. Huguenot schools were suppressed, and all children were to be baptized and brought up in the Roman Catholic faith. All Huguenots, except ministers, were prohibited from going abroad, and the property of those who had already gone was declared forfeited unless they returned within four months. In carrying out this harsh decree the most savage persecution was indulged in. Torture, hanging, insults worse than death to women, the galleys and imprisonment for life were the ordinary occurrences for the next sixty years. (See DRAGONNADES.) In the twenty years preceding the Revocation, it is believed that 400,000 Protestants fled from France, and that 600,000 escaped in the twenty years that followed.

In the Cévennes, however, the people were too poor to escape, and all over Languedoc the Huguenots assembled for purposes of worship in secret. A religious ecstasy ran through the country, and so-called prophets appeared among the people. In connection with this phase of the excitement, there were noted those abnormal physical and mental conditions which always follow prolonged fasting and vigils under strong religious excitement. Louvois, Louis XIV.'s War Minister, determined to put down this movement in an exemplary manner. An army of 40,000 was raised, and forts were erected at Nîmes, Saint Hippolyte, Alais, and Anduze. The Abbé du Chaila, a Roman Catholic missionary from Siam, had been appointed inspector of missions in the Cévennes. He introduced the 'squeezers' (an instrument of torture which resembled the Scotch 'boot'), and his cruelty at last broke the patience of the victims. His assassination, July 23, 1702, was the first blow in the war. There was to have been a general massacre of Roman Catholic priests, but the plan failed, and the originator, Esprit Séguier, soon fell. He was succeeded by La Porte, an old soldier, who, as his forces increased, assumed the title of Colonel of the Children of God, and named his country the Camp of the Eternal. His captains were selected from those on whom the prophetic influence had fallen, such as the forest ranger, Castanet, the wool-carders, Condère and Mazel, and the soldiers, Catinat, Joany, and Ravenel; but the most famous were Roland and Jean Cavalier, the baker's boy (see CAVALIER, JEAN). For three years the Camisards held out. Against them was sent an army of 60,000 men, among them an English brigade, which had just returned from the persecution of the Vaudois. A policy of extermination was commenced, and in the upper Cévennes alone 466 villages were burned, and nearly the entire population put to the sword. The insurgents, on the other hand, indulged in acts of violence against the Catholic population and priesthood, of whom more than 4000 are estimated to have perished. Catholic churches were burned in large numbers. Clement XI. issued a bull against the "execrable race of the ancient Albigenses," promising remission of sins to the holy militia which was now formed among the Roman Catholic population under the name of Cadets of the

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Cross. The formidable force brought against them induced Cavalier to listen to proposals, and he finally assented to a surrender on being guaranteed liberty of conscience, the right of assembly outside of walled towns, the liberation of all his people then in durance, and the restitution to emigrants of their civil rights and property. Still the greater part of the army, under Roland, Ravenel, and Joany, refused, and insisted upon the complete restoration of the Edict of Nantes. The Camisards continued the war until the beginning of 1705, at which time their leaders had been killed or dispersed, and they had become disorganized. In 1711 all outward signs of the Reformed religion had disappeared, and on March 8, 1715, a few months before his death, Louis XIV., by a special medal and by proclamation, announced the entire extinction of heresy. Fourteen years afterwards, in spite of the strictest surveillance, aided by military occupation, there had been organized in Languedoc 120 churches, which were attended by 200,000 Protestants. Persecution could not utterly suppress them; but it was not until 1775 that the last galley slave from Languedoc was liberated, and not until 1789 that the National Assembly repealed all the penal laws against Protestantism. Consult: Baird, "The Camisard Uprising," in *Papers of the American Society of Church History*, Vol. II. (New York, 1890); Bray, *The Revolt of the Protestants of the Cévennes* (London, 1870); Smiles, *The Huguenots in France After the Revocation of the Edict of Nantes* (London, 1877); Goiffon (ed.), *Relation historique de la révolte des fanatiques ou des Camisards* (Nîmes, 1874); Louvreleuil, *Le fanatisme renouvelé* (Avignon, 1702-07). See CÉVENNES.

CAM'LAN. A famous battle in Arthurian legend. It saw the death of Arthur and the dissolution of the Round Table. Antiquarians place it in Cornwall, England, and set its date either in A.D. 537 or 542. See ARTHUR, KING; also MODRED.

CAMLET (Ar. *khamlat*, camlet, from *khaml*, pile, plush; at an early period folk etymology wrongly referred it to *camel*). A fabric originally made of camel's hair, and more recently of the hair of the Angora goat. At present camlets are woven from wool alone, or from wool and cotton or linen mixed, and spun hard.

CAMMERHOFF, kăm'mĕr-hôf, JOHN CHRISTOPHE FREDÉRIC (1721-51). A Moravian bishop and missionary in America. He was born near Magdeburg, Germany; became a bishop of the Moravian Church in 1746, and in the same year came to America, where until his death he acted as Bishop Spangenberg's assistant. He devoted his attention largely to missionary work among the Indians, especially among the Iroquois, and met with considerable success in gaining converts. He was adopted into the Turtle tribe of the Oneidas, under the name Gallichwio ('A Good Message'), and for more than a generation was remembered with singular respect and veneration by the Indians of the Confederacy. His death was caused by the exposures and hardships incident to a journey of 1600 miles to Onondaga, which he made in 1750.

CAMÕES, kä-mōnsh' *or* kämō'ĕnsh, commonly written in English CAMOENS, LUIZ DE (c.1524-79). The greatest poet of Portugal, who exerted an important influence on the national drama, and developed the Portuguese lyric to its highest perfection, but owes his fame mainly to the celebrated historical epic, *Os Lusiadas*. Son of a sea captain, who was early lost in a shipwreck, and descendant of a family of distinction and rank, Camões was born in Lisbon—or more probably in Coimbra—in 1524 or 1525, about the time of the death of Vasco da Gama, to whom he was related, and whom his grandfather, Antão Vaz, had accompanied on his first voyage to India. He is supposed to have attended the University of Coimbra, although his name does not appear upon the records. At all events, he early showed remarkable proficiency in the classics and in contemporary literature, presumably due to the guidance of his uncle, Bento de Camões, who was then prior of the famous Santa Cruz monastery. It was during these early days in Coimbra that Camões was inspired by some fair but unknown maiden, whom he celebrated in a series of canzoni, sonnets, and elegies, Petrarchian in form and platonic in spirit, but notable for their purity of diction and grace of form. Having finished his studies, Camões went to Lisbon in 1542, where he frequented the Court and conceived a romantic passion for Catherina de Athaide, one of the Queen's ladies of honor, whom he celebrated under the anagram of Natercia, and whose complaisance was the beginning of all his trobules. Banished from the Court and separated from the woman he loved, Camões joined the expedition of John III. against Morocco, where he served two years, losing an eye during a naval engagement in the Strait of Gibraltar. On his return to Lisbon, he found no more praise for his bravery than formerly for his poems. Disappointed in all his hopes, he determined to leave his native land forever, and sailed for India as a common soldier. For sixteen years he led an adventurous life in the East, unprosperous for the most part, though for a time he held a lucrative position at Macao, as administrator of the effects of deceased persons. But he misused his powers, made enemies by his writings, incurred debts, and suffered misadventures in love. At last he turned his steps homeward, and after disheartening delays and countless hardships, reached Lisbon once more, in 1570, only to find it overrun with the plague, in the throes of the Inquisition, and governed by a young, feeble, and visionary monarch. Nevertheless he published his epic, the *Lusiad*, the only valuable possession which he had brought back from all his wanderings, and dedicated it to the young King, Sebastian, who was very gracious; but all the patronage bestowed upon the author was a niggardly pension of about $20, and permission to frequent the Court. Camões survived a few more troubled years, living with his aged mother. When Sebastian undertook the African campaign, his patriotic zeal flamed up once more, though he could not accompany the King either as poet—since Diogo Bernardes and Cortereale were preferred to him—nor as soldier, because too old. The news of the defeat of Alcacer-Quebir broke his heart. In a letter, the last lines that he wrote, he says: "It was not enough that I should die in my fatherland; I am dying with it." He died in a hospital in 1759, and his interment passed almost unnoticed.

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The *Lusiad* (*Os Lusiadas*, The Lusitanians) celebrates the chief events in the history of Portugal, and is remarkable among modern epics for the admirable manner in which it has imitated the true national and popular spirit of ancient epic poems. Among the most famous passages are the tragic story of Iñes de Castro, and the apparition of the giant Adamastor, who appears as the Spirit of the Storm to Vasco da Gama when passing the Cape. The metre of the *Lusiad* is the familiar *ottava rima* of the Italian poets, and his treatment of it is full of charm. The chief interest of the poem is due to the fiery spirit of patriotism which pervades it, and its instrinsic beauty has made it one of the masterpieces of what Goethe termed the 'world-literature.' It has been translated into all the principal languages of Europe. Besides his epic, Camões wrote sonnets, odes, elegies, satires, epigrams, epistles, and three comedies—*Os Amphitryoes*, modeled upon Plautus; *King Seleucus;* and *Filodemo*. The most complete edition of his works is that of the Visconde de Juromenha (6 vols., Lisbon, 1860-69); a cheaper and more convenient edition is that of Theophile Braga (3 vols., Oporto, 1874). For his biography, consult: Adamson, *Memoirs of the Life and Writings of Luis de Camões* (London, 1820); Braga, *Historia de Camões* (3 vols., Oporto, 1873-75); Castello-Branco, *Luis de Camões* (Oporto, 1880); Burton, *Camões, His Life and His Lusiads* (London, 1881); Storck, *Luis de Camoens Leben* (Paderborn, 1890).

CAM'OMILE. See CHAMOMILE.

CAMONICA, kăm'ō-nē'kā, or VALLE CAMONICA. A picturesque valley in the Province of Bergamo, North Italy, consisting of the basin of the Oglio River, inclosed by outlying and densely wooded ridges of the Rhætian Alps. It extends for 50 miles from northeast to southwest to Lake Iseo. It has iron, copper, and lead mines and marble and slate quarries. Its soil is fertile, and agriculture is well developed, maize, grapevines, and mulberry-trees being extensively cultivated.

CAMORRA, kā-mŏr'rā (OIt., frock, cassock). A secret society with ramifications throughout the former Kingdom of Naples, which exerts considerable influence among the lower classes in that part of Italy, and whose activity extends to higher official quarters. The members are called *Camorriste*. Under the Bourbons, Camorriste appeared in public places on all occasions of popular amusement, and levied contribution which their victims dared not refuse. They undertook the transport of smuggled goods, and contracted for the commission of serious crimes. Their readiness for violence and murder, and their close association among themselves, made them so much dreaded that Camorriste who had been thrown into prison succeeded in exacting money from their fellow-prisoners and from the jailer himself. When at the height of its power, the society had a central rendezvous in every large provincial town, and twelve in the city of Naples. Those who belonged to each of these sections of the society were under the absolute government of a chief elected by themselves, with whom was associated a treasurer. The latter had the charge of the common fund into which all the Camorriste of that section paid their entire gains for equal distribution among all their associates. Candidates for membership were obliged to show that they had been guilty neither of espionage nor theft; also that neither their wives nor their sisters were prostitutes, and to swear upon an iron crucifix a fearful oath of fidelity and secrecy. The candidate remained for a year, with the designation of *picciotto d'onore*, as a pupil under an old Camorrista; and having completed this probation, and given proof of his courage and obedience in circumstances involving danger of life, was advanced to the rank of a *picciotto di sgarro*. Finally, after a longer period, in which he had given proof of his fitness on a number of occasions, he was admitted to full membership of the society as a Camorrista. Each Camorrista carried about with him two knives of peculiar form, by which the members of the society recognized each other. They were held under the strictest discipline. Disobedience was punished by flogging, suspension from employment, or expulsion; treachery, by death. If two Camorriste quarreled, their chief decided the question between them; but in difficult cases a duel with daggers was the mode of decision. Under Ferdinand II. the Camorra was tolerated for political reasons. The Government of Francis II. endeavored to put down the society, and the police received instructions to seize and transport all known members of it. Those who remained entered into alliance with the Garibaldi Committee, and rendered essential service in the expulsion of the Bourbons. When the Neapolitan and Sicilian influence became strong in the politics of the new Italy (see ITALY), the Government attempted to use the Camorra in its struggle with brigandage, and thus strengthened the influence of the society by making it a political force, as it had often been under the Bourbons. Of recent years the Camorra has tended to assume more of the nature of a political machine, manipulated for the purpose of plunder. For a number of years the society was in full control of the municipal government of Naples, and included among its members the heads of the chief departments and practically the entire body of city employés. The association put up offices for sale, guaranteed officials immunity in the pursuit of peaceful peculation, and, in the last extreme, defended them in the courts. Conditions finally became so scandalous as to warrant (1899) the intervention of the Italian Government. Municipal government in Naples was suspended, while a royal commission was appointed to investigate the operations of the Camorra. The revelations of the commission led to the formation of an Honest Government League, which succeeded in completely defeating the candidates of the Camorra in the municipal elections of 1901. Consult: Monnier, *La Camorra* (Florence, 1863); Heckethorn, *The Secret Societies of All Ages and Countries* (New York, 1897); Umiltà, *Camorra et Mafia* (Neuchâtel, 1878); Blasio, *Usi e costumi dei camorriste* (Naples, 1897).

CAMOUFLET, kā-mōō'flā, *Fr. pron.* kā'mōō'-flā'. See MINES AND MINING, MILITARY.

CAMP, MILITARY. A collection of tents or huts for the shelter of troops, in a position, or on a piece of ground, specially adapted or prepared for such occupation. The evolution of

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the modern camp, or military encampment, is practically the history of modern armies, strategy, engineering, and sanitation. Of ancient camps the Romans give us the best example. The advance party consisted of a tribune and several centurions, whose duty it was to select a suitable site for the camp, marking out, first of all, a spot for the prætorium, or general's tent, round which, as a centre of the whole system, the rest of the camp was marked out. The camp streets were broad, measuring from 50 to 100 feet, and allowance was always made for the *forum*, or public market-place. Polybius (in the Second Century B.C.) is authority for the full details of the Roman camp system. With regard to their general description, he states that the best conception which can be formed of a Roman camp of the more permanent kind is by regarding it as a military town. According to the same authority, the Greeks trusted mainly to the judicious selection of their ground, and regarded the natural advantages which they thus secured as supplying in a great measure the means of artificial defense. The Greeks, consequently, did not use the regulation type of camp so rigorously adhered to by the Romans. The Roman plan seems to have been the one most generally adopted through the Middle Ages, with such additions as new arms, new formations, and new branches necessitated. Modern camps, in home countries or possessions, are chosen for their particular local advantage, sanitation and the general health of the troops being the first consideration. In time of war, or when campaigning in an enemy's country, there must be added precautions against attack, locating the camp in a place giving every possible natural advantage. Care is taken that there are no commanding positions within range where an enemy's artillery could be effective; that it is capable of defense; that it is roomy and safe enough to assemble the troops or get under way without hindrance or confusion; and that there are water facilities for man and beast. These and such other rules as circumstances may dictate form a general basis throughout armies of the civilized world. In the United States Army camps are organized according to directions given in the drill regulations. See ENCAMPMENT.

CAMP, kăn, MAXIME DU. See DU CAMP, MAXIME.

CAMPA, käm'pâ. See ANTI.

CAMPAGNA, kâm-pä'nyâ, GIROLAMO, called de Vergna (1552-c.1623). An Italian sculptor. He was born in Verona, and studied under Sansovino and Cataneo, many of whose works he completed. His best-known original productions consist of the isolated altar in the Santi Giovanni e Paolo, Venice, and the bronze group representing Christ resting on a globe carried by the four Evangelists, at San Giorgio Maggiore, Venice.

CAMPAGNA DI ROMA, kâm-pä'nyâ dê rō'-mâ (It., plain of Rome). An undulating, uncultivated, and unhealthful plain of Italy surrounding Rome, including the greatest part of ancient Latium. Applying the name in a broad sense to the district extending from Cape Linaro, south of Civitâ Vecchia, to Terracina, beyond the Pontine Marshes, its length is about 90 miles, and its breadth inland, to the Alban and Sabine hills, ranges from about 25 to 40 miles. A broad strip of sandy plain skirts the Mediterranean. The ground, which never rises higher than 200 feet above the sea, is almost entirely volcanic, and the lakes represent craters of extinct volcanoes. The vapors rising from this district, and especially from the Solfatara (q.v.), produce the pestilential atmosphere styled *aria cattiva*. The number of inhabitants is very small, and in summer they are driven from the Campagna di Roma by its pestilential air, and seek shelter in Rome and other neighboring places. In autumn herdsmen descend from the Apennines to the Campagna di Roma with their herds, the pasture in some parts being rich and abundant. Until the Fifth and Sixth centuries A.D. the Campagna di Roma was well inhabited, though not very healthful. In the last century of the Roman Republic and under the emperors, it was filled with the luxurious villas of wealthy Romans. The invasion of the barbarians began the devastation of the Campagna di Rome, and the insecurity of the region during the Middle Ages and the failure of the water-supply led to its gradual depopulation and the increase of the malignant conditions. During recent years, improved drainage, the planting of eucalyptus trees, and other works undertaken by the Government have done much to make the Campagna di Roma more healthful and lead to its gradual reclamation. The peculiar scenic aspects of the Campagna, with its many remains of Roman structures, combined with the characteristic atmospheric effects, have rendered it an inspiring subject for painters.

CAMPAGNOLA, käm'pâ-nyō'lâ, DOMENICO (c.1490-c.1564). An Italian painter and engraver. He was born in Padua, and studied in the school of Titian, where his proficiency is said to have aroused the jealousy of his master. His best-known works are four pictures of prophets, in the Venice Academy; oil pictures in the Scuola del Carmine, Padua; and fresco paintings in the Scuola del Santo, Padua, which are said to rival those of Titian in the same place. His etchings are executed in a masterly style. The best-known are the "Descent of the Holy Spirit on the Day of Pentecost" and the "Assumption of the Virgin."

CAMPAIGN, kăm-pān' (Fr. *campaigne*, *campagne*, open country, military operations; Med. Lat. *campania*, level stretch of country, from Lat. *campus*, field), MILITARY. A connected series of military operations having a definite purpose and object. It may apply to the whole field of hostilities, or to each separate and distinct command, if such command is operating with its own programme. For example, in the Civil War of 1861-65, may be cited General Grant's campaign, General Sherman's campaign, General Lee's campaign; while, on the other hand, under the title of the Egyptian Campaign was embraced every operation of the entire war.

CAMPAIGN, THE. A poem with a Latin version, by Joseph Addison, written at the instance of Lord Godolphin, to celebrate the battle of Blenheim in 1704. The amazing success of the piece was largely due to its happy description of Marlborough as one who "rides the whirlwind and directs the storm." It gained for the author first a commissionership of appeals and then the office of Under Secretary of State.

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CAMPAN, kăn'pän', JEANNE LOUISE HENRIETTE GENEST (1752-1822). A French author. She was first lady of the bedchamber to Marie Antoinette, and her faithful companion till they were separated at the sacking of the Tuileries, August 10, 1792. She then established a school at Saint-Germain, and later won the favor of Napoleon, who made her superintendent of an academy at Ecouen founded by him for the education of daughters and sisters of members of the Legion of Honor. On the abolition of the school in 1814, she retired to Mantes, where she died, among friends, but saddened by the calumnies of Royalists, who could not forgive her connection with Napoleon. She left some interesting and valuable *Mémoires sur la vie privée de Marie Antoinette* (1823), followed by *Journal anecdotique* (1824), a treatise, *De l'éducation,* and some pedagogical essays, *Correspondance inédite avec la reine Hortense* (1835).

CAMPANA, kăm-pä'nâ, FABIO (1819-82). An Italian composer, born in Leghorn. He was educated at the Musical Lyceum in Bologna, and in 1850 went to London, where he remained, teaching and composing, until his death. His works consist of *Caterina di Guisa* (1838); *Giulio d'Este* (1841); *Esmeralda* (1869); and many songs and romances.

CAMPAÑA, kăm-pä'nyâ, PEDRO (1503-80). A Flemish-Spanish painter. He was born in Brussels, and his name is said to have been originally Pieter de Kempeneer. He completed his studies in Bologna and Rome, and established an academy in Seville in 1547. His famous "Descent from the Cross" (1548), now in the cathedral, was a favorite study of Murillo. Later in life he returned to the Netherlands. The pictures of Campaña are full of life, and are characterized by truthful delineation and powerful coloring. Several of them are at present in various churches of Seville.

CAMPANELLA, kăm'pâ-nĕl'lâ, TOMMASO (1568-1639). An Italian monk and philosopher. He was born in Stilo, Calabria, and studied in Naples and Cosenza. His *Philosophia Sensibus Demonstrata,* which included a defense of Telesius against the scholasticism of the Aristotelians, was published in 1591. He was accused of heresy and of conspiring against the Government, and spent twenty-seven years in prison at Naples, during which time he wrote much, one of his works being his famous "City of the Sun," which has been translated into English by T. W. Halliday, and published in *Ideal Commonwealths* (Morley's *Universal Library*). He was released through the intervention of Pope Urban VIII., but renewed persecutions compelled him to seek refuge in France, where he remained until his death. He was kindly received by Richelieu, and granted a pension of 3000 livres by Louis XIII. He expounded a philosophy many of whose tenets resemble the views of Descartes and Kant. His works, eighty-two in all, and treating of many different subjects include: *De Sensu Rerum et Magia* (1620); the *Civitas Solis,* mentioned before (printed with his *Philosophia Epilogistica Realis,* 1623), a description of a philosophic republic; and *Atheismus Triumphatus* (1636), which assumes the character of an apologia. His complete works have been edited by d'Ancona (Turin, 1854). His sonnets were translated by J. A. Symonds, in a volume with those of Michelangelo (1878). For his biography, consult: Baldacchini (Naples, 1840), and Amabile (Naples, 1883-87), as well as Dareste, *Morus et Campanella* (1843).

CAMPANERO, käm'pâ-nä'rô (Sp., bellman, from *campana,* bell). The bell-bird.

CAMPANERTHAL, kâm-pä'nĕr-täl, or **KAMPANERTHAL,** DAS. A work on the immortality of the soul by Jean Paul Richter, which derives its name from the beautiful valley of Campan in the Pyrenees, traversed by the Adour.

CAMPANHA, kâm-pä'nyâ (Portug., plain). A town of Brazil in the State of Minas Geraes, about 150 miles northwest of Rio de Janeiro (Map: Brazil, H 8). It is situated in a gold-mining region and has several churches, a Latin school, a hospital, theatre, etc. Population, nearly 7000.

CAMPA'NIA (Lat., from Lat. *campus,* plain, Gk. Καμπανία, *Kampania*). A district of ancient Italy lying along the Tyrrhenian Sea, and bounded on the land side by Latium, Samnium, and Lucania (Map: Italy, J 6). Originally inhabited by people of Oscan race, it was early invaded by the more civilized Greeks, who founded there the cities of Cumæ and Neapolis (Naples). At a later period it came under the Etruscan domination, but the bulk of the population remained Oscan in race and language until Roman times. Campania has always been noted for the volcanic character of the country. Besides Vesuvius (of which the first eruption in historic times was that which destroyed Pompeii in A.D. 79), the whole region north of Naples was and is a scene of volcanic phenomena. Here were the *Campi Phlegræi* of the Greek and Latin writers, the modern *Solfatara* or sulphur-field near Puteoli (Pozzuoli), and here, near Cumæ, was the Lake of Avernus, the fabled entrance to the lower world. Notwithstanding this gloomy character, the great plain of Campania was always noted for its wonderful fertility and its charming climate and scenery. The Romans, who overran it as early as B.C. 340, called it *Campania Felix* (Happy Campania). They did not succeed in Romanizing the inhabitants until after the time of Sulla. The coast of Campania then became a favorite resort for the wealthy Romans, who built handsome villas at Baiæ, Puteoli, Misenum, and elsewhere. Cicero had a villa at Pompeii. In his new reorganization of Italy, Augustus made Campania his first district (*regio prima*). The chief ancient towns were Capua, Cumæ, Neapolis, Nola, Pompeii, and Salernum.

CAMPANILE, kâm'pâ-nē'lâ (It., from Med. Lat. *campana,* a bell). A name adopted from the Italian to signify a bell-tower of the large kind, and usually applied only to such as are detached from the church. This type of tower is found hardly at all outside of Italy, where it is the only prevailing kind of church tower. See BELL-TOWER; BELFRY; MINARET; TOWER; FLORENCE; VENICE.

CAMPANINI, käm'pâ-nē'nê, ITALO (1846-96). An Italian tenor, born in Parma. He enlisted in the army of Garibaldi when 14 years of age, and took part in the fight before

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Milazzo. Having discovered during the campaign that he had a fine voice, he studied singing in Parma, and made his first appearance as the notary in *La Sonnambula* in his native town. He sang with indifferent success in various opera companies until 1869. In that year he went to Milan and placed himself under the tuition of the celebrated Francesco Lamperti. After a thorough training he made his début in *Faust* at La Scala of Milan, and was pronounced by a critical audience to be one of the finest tenors of the age. In 1872 he made his London début as Genaro, in *Lucrezia Borgia*, and in 1873 sang with Christine Nilsson in New York. He was heard in the United States during several subsequent seasons and became the most popular operatic tenor of his day in the country. Endowed with a true tenor voice of great power and sweetness, he was equally equipped to sing lyric and dramatic parts; but he shone especially in rôles demanding manly passion and fervor, e.g. those of *Aida*, *Carmen*, *The Huguenots*, and *Faust*. He was also a notable Lohengrin. His repertoire included nearly 100 operas and oratorios. In later years, partly owing to an affliction of the throat, his voice failed; but his fine method of producing it and his intelligent singing and acting kept him high in popular favor until a few years before his death. He died in Vigatto, near Parma.

CAMPAN'ULA (Med. Lat., dim. from Late Lat. *campana*, bell). A genus of plants of the order Campanulaceæ, distinguished by a bell-shaped corolla with five broad segments. The species number nearly 300 and they are found mostly in the higher latitudes of the northern hemisphere, at high elevations in temperate regions, and about the Mediterranean Sea. The species are mostly herbaceous and are grouped as annuals, biennials, and perennials. The flowers are blue, violet, or white, and many are cultivated as border plants. The name bell-flower or bellwort is given to many, and is sometimes extended to include all the species. One of the most common is the bellflower, *Campanula rotundifolia*, a perennial species indigenous to America, Europe, and Siberia. For illustration, see Plate of CAMELLIA, ETC. The Canterbury bell, *Campanula medium*, is a biennial species frequently cultivated. It will flower the first season if sown early and transplanted. Among annual species in cultivation are *Campanula erinus*, *Campanula macrostyla*, and *Campanula Americana*. *Campanula pyramidalis* with blue, lilac, or white flowers, *Campanula glomerata* with pale-blue flowers, and *Campanula murialis* are all worthy of cultivation. Formerly medicinal properties were ascribed to some species, and the name throatwort was given to *Campanula trachelium* in England, where it was held valuable in some affections of the throat.

CAMPAN'ULA'CEÆ (Neo-Lat., from Med. Lat. *campanula*, little bell), BLUEBELL FAMILY. A natural order of dicotyledonous plants, the species of which number about 1000, embraced in 59 genera. They are mostly herbaceous, a few only being trees or shrubs, and are characterized by alternate exstipulate leaves and usually by a bitter latex. The inflorescence is usually racemose; the flowers regular, 5-parted; and the fruit a capsule or berry. The flowers of most of the species are comparatively large, but in Phyteuma and Jasione they are small and massed in heads like the compositæ. The Campanulaceæ are mostly found in the temperate and colder climates of the northern hemisphere and the flowers of many are quite ornamental. The fruits of one member of the family (*Canarina campanula*) which grows in the Canary Islands are edible. The chief genera are Campanula, Phyteuma, Jasione, and Lobelia.

CAMPAN'ULA'RIA (Neo-Lat., from Med. Lat. *campanula*, little bell). A 'bell-hydroid' of the siphonophorous family Campanularidæ, common about tide-covered rocks, and characterized by having the "hydroid heads inclosed in a calyx, [and] the medusæ, if free, with gonads on radial canals" (Davenport). These are known as bell-hydroids, and are numerous, the genus Obelia being specially common and well represented on the New England coast. See illustration under ALTERNATION OF GENERATIONS.

CAMPARDON, kăn'pär'dôn', EMILE (1834—). A French author, born in Paris. He was educated at the Ecole des Chartes, and later became chief of a department in the National Archives. In this capacity he utilized a great number of documents in the preparation of his literary works, all of which are distinguished by marked originality and by a profound knowledge of the men and affairs of the Eighteenth Century. The following are a few of his principal publications: *Histoire du tribunal révolutionnaire de Paris* (2 vols., 1861); *Marie Antoinette à la conciergerie* (1862); *Madame de Pompadour et la cour de Louis XV.* (1867); *Voltaire, documents inédits* (1880); *L'académie royale de musique au XVIIIe siècle.*

CAMPASPE, kăm-păs'pê. A river of Victoria, Australia, which flows north through Dalhousie County and joins the Murray at Echua (Map: Victoria, D 3). The plains along its lower course are well cultivated. Length, about 120 miles.

CAMPASPE (Gk. Καμπάσπη). A mistress of Alexander the Great. Apelles is said to have taken her for the model of his "Venus Anadyomene."

CAMPBELL, kăm'b'l, or, *Scot. pron.* kăm'l. See ARGYLL, MARQUIS OF.

CAMPBELL, ALEXANDER (1788-1866). An American clergyman, the founder of the Disciples of Christ, or 'Campbellites.' He was born in Ireland and was educated at the University of Glasgow. He came to the United States in 1809, and settled in Bethany, Va., as pastor of a Presbyterian church, from which he soon departed and organized a society, now known as the Disciples of Christ, whose doctrine was that the Bible should be the sole creed of the Church. In 1841 he founded Bethany College (Bethany, W. Va.), and remained its president until his death. He established, in 1823, the *Christian Baptist*, which in 1829 became the *Millennial Harbinger*, and which he continued until 1863. He engaged in many controversies and published no less than fifty-two volumes, including hymn-books and a translation of the New Testament. His most typical doctrinal works were *The Christian System* and *Remission of Sin*. He published *Memoirs of Thomas Campbell* (1861), his father and associate in his work. Consult

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Richardson, *Memoir of Alexander Campbell* (Philadelphia, 1868). See DISCIPLES OF CHRIST.

CAMPBELL, ALLAN (1815-94). An American civil engineer and railroad president. He was born in Albany, N. Y., and at the age of 21 was chief engineer of a railroad. He built the first railroad ever operated in South America; was prominent in the construction of the Harlem Railroad, the Pacific Railroad, and that from Callao to Lima, Peru, and was president of the Harlem Railroad until succeeded by 'Commodore' Vanderbilt. He was appointed commissioner of public works of New York City in 1876, and during 1883 was comptroller of the city. In 1882 he was defeated as nominee of the Republicans and Independents for the office of mayor.

CAMPBELL, BARTLEY (1843-88). An American dramatist. He was born in Allegheny City, Pa., became a journalist and founded the *Evening Mail* in Pittsburg. He started a monthly magazine in New Orleans; but the success of his first play, *Through Fire* (1871), induced him to devote himself to dramatic authorship. *My Partner* (1879) was his greatest success. He was for a time manager of the Fourteenth Street Theatre, New York. He became insane in 1886 and died in an asylum.

CAMPBELL, BEATRICE STELLA TANNER (1867—). An English actress, born in London, and married in 1884 to Patrick Campbell, who fell in the South African War in 1900. She was already well known as an amateur before she made her début on the professional stage, at the Alexandra Theatre, Liverpool, in 1888. In March, 1890, she appeared in London at the Adelphi, where she afterwards played again in 1891-93, creating several parts. She gained a wide reputation in *The Second Mrs. Tanqueray* (1893) at the Saint James Theatre, where also she appeared in *The Masqueraders* (1894). As Kate Cloud in *John-a-Dreams*, produced by Beerbohm Tree at the Haymarket in 1894, she made another success, and again as Agnes in *The Notorious Mrs. Ebbsmith*, at the Garrick (1895). Among her later performances have been those in *Fédora* (Haymarket, 1895); Ibsen's *Little Eyolf* (Avenue Theatre, 1896); and notably in her Shakespearean revivals with Forbes Robertson at the Lyceum, as Juliet (1895), Ophelia (1897), and Lady Macbeth (1898). In 1900 she appeared in a revival of *Magda* at the Royalty Theatre. In the seasons of 1901-02 and 1902-03 she visited the principal cities of the United States, presenting her best-known rôles.

CAMPBELL, CHARLES (1807-76). An American historian, born in Petersburg, Va. He graduated in 1825 at Princeton, was head of a classical school at Petersburg from 1842 to 1855, and subsequently was principal of Anderson Seminary in the same city. He was a contributor to the *Southern Literary Messenger*, edited the *Orderly Book* of Gen. Andrew Lewis for 1776 (1860), and published *The Bland Papers* (1840-43), and *An Introduction to the History of the Colony and Ancient Dominion of Virginia* (1849).

CAMPBELL, Sir COLIN, Lord Clyde (1792-1863). A British field-marshal, born in Glasgow, Scotland, October 20, 1792. He was the eldest son of Colin Macliver, a carpenter. His maternal uncle, Colonel John Campbell, sent him to school at Gosport, and in 1807 introduced him to the Duke of York for an army commission. The Duke mistook him for a Campbell, and his uncle hushed the boy's half-uttered protest with the remark, "It is a good name to fight under." He was gazetted as Colin Campbell, ensign, in 1808; served in the Walcheren expedition, 1809; and by 1813 attained a captaincy. He fought through the war in the Spanish peninsula with distinction; took part in the expedition to the United States in 1814; and afterwards spent nearly thirty years in garrison duty at various English stations. He served in China in 1842, and was present at the attack on Chusan. He next served in the Punjab, India, commanding the left at the battle of Chillianwallah, then for three years commanded in the Peshawur district with uniform success against the hill tribes. He was rewarded with the C.B. and K.C.B., and at the outbreak of the Crimean War in 1854 was appointed commander of the Highland Brigade. He took a prominent part at the battle of the Alma; and with the Ninety-third Highlanders, in the immortalized 'thin red line,' beat back the Russian cavalry in their attack on Balaklava. His services were rewarded with promotion to the rank of major-general; he was created a Knight Grand Cross of the Order of the Bath, and received the cross of the French Legion of Honor and other decorations. He was appointed inspector-general of infantry, and in 1857, at twenty-four hours notice, started for India to command the forces engaged in quelling the mutiny, which by his energy and judgment was soon utterly subdued, his relief of Lucknow being especially brilliant. A notable characteristic of Campbell's generalship was the care he took of his men, his victories being won with the minimum expenditure of the lives of his soldiers. For his exploits in India, Campbell, in 1858, was raised to the peerage as Baron Clyde, and the East India Company granted him an annuity of £2000. He returned to England in 1860, and in 1862 was made field-marshal. He died August 14, 1863, and was buried in Westminster Abbey. Consult Shadwell, *Life of Colin Campbell* (London, 1881).

CAMPBELL, DOUGLAS (1839-93). An American lawyer and historical writer, born in Otsego County, N. Y. He graduated at Union College in 1850, studied law at Harvard, served for a time in the Civil War as captain of the 121st New York Volunteers, and was admitted to the New York bar in 1866. After about twenty years of practice, he retired, partly on account of ill health, to devote himself exclusively to the study of American history, and published a book, *The Puritan in Holland, England, and America, an Introduction to American History* (2 vols., New York, 1892), which attracted considerable attention and has identified Campbell's name with the theory that the legal and political institutions of the United States were ultimately derived, not from England, but from Holland—directly through the Dutch settlers of New York and indirectly through the Puritans of Massachusetts, who, before coming to America, had spent some years in Amsterdam and Leyden. Though the book displays considerable erudition, its thesis has met with little support among historical scholars. Campbell also published two pamphlets entitled, *Historical Fallacies Regarding Colonial New York* (1879); and *The Origin of American Institutions as Illustrated in the History of the Written Ballot* (1891).

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CAMPBELL, Douglas Houghton (1859—). An American botanist, born in Detroit, Mich. He graduated at the University of Michigan in 1882 (Ph.D., 1886), and afterwards took a supplementary course at Bonn, Tübingen, and Berlin (1886-88). In 1891 he became lecturer on the evolution of plants at Stanford University. His principal work is *Elements of Structural and Systematic Botany* (1890).

CAMPBELL, George (1719-96). A Scotch clergyman, born in Aberdeen. He was educated at Marischal College, studied divinity in Edinburgh and Aberdeen, and was ordained to the ministry in 1848. He was appointed principal of Marischal College in 1759; in 1771 was made professor of divinity there, and in 1795 retired from both posts. He is chiefly known for his *Dissertation on Miracles* (1762), a reply to Hume's essay (1748). His *Philosophy of Rhetoric* (1776) was also highly valued.

CAMPBELL, Sir George E. (1824-92). An English statesman. He was educated in Edinburgh, Saint Andrews, and Haileybury. In 1858 he was appointed judge of the High Court of Judicature in Calcutta, and in 1867 chief commissioner of the Central Provinces of India. He then served several years in Parliament, but in 1871 returned to India as Lieutenant-Governor of Bengal. In 1874 he went back to England to become a member of the council of India. He took an active part in the agitation on the Eastern question in 1876, as a supporter of the policy advocated by Mr. Gladstone. His more important books include *Modern India* (1852); *India as it May Be; Handy Book of the Eastern Question* (1876); *White and Black in the United States; The British Empire* (1889).

CAMPBELL, James Edwin (1843—). An American politician. He was born in Middletown, Ohio, was educated in the public schools, studied law, and in 1863 enlisted as a gunner in the navy, serving with the Red River and Mississippi flotillas. He was prosecuting attorney of Butler County in 1873, served in Congress as a Democrat from 1882 to 1888; and in 1889 defeated Joseph B. Foraker for the Governorship of Ohio. In 1891 he was defeated by William McKinley, and in 1895 by Asa S. Bushnell.

CAMPBELL, James Valentine (1823-90). An American jurist, born in Buffalo, N. Y. He graduated at Saint Paul's College (College Point, L. I.) in 1841, and was admitted to the bar in 1844. Upon the establishment of the Michigan Supreme Court in 1857, he was appointed an associate justice. He was a professor in the law school of the University of Michigan from 1859 to 1885. His judicial decisions are highly valued. He edited Walker's *Chancery Reports* (1845), and wrote *Outlines of the Political History of Michigan* (1876), a subject in which he made much research.

CAMPBELL, John (? -1806). A British soldier, born in Strachur, Scotland. He entered the army in 1745, and fought with distinction in the Scottish rebellion (1745), and in Flanders (1747). During the French and Indian War in America he served as captain of the Forty-second Highlanders, and was wounded at Ticonderoga (1758). As lieutenant-colonel of the Forty-seventh Infantry he again came to America with his regiment in 1776 and was successively appointed major-general (1779), colonel of his regiment (1780), and commander of the British forces in West Florida, where he was eventually compelled to surrender Pensacola to the Spaniards, May 10, 1781. His advancement to the rank of general followed in 1797.

CAMPBELL, John (1779-1861). Lord High Chancellor of England. He was the son of a Presbyterian minister of Cupar, County of Fife, Scotland, where he was born in 1779. He was at first destined for his father's calling, and was sent at an early age to the neighboring University of Saint Andrews. But he had no inclination for a clerical life, and, when he had completed his academic studies, at the age of 19, he went to London and engaged in newspaper work. At the same time he became a student in Lincoln's Inn, where he was a pupil of the distinguished special pleader Samuel Warren, and in 1806 was called to the bar. While waiting for clients he became a court reporter and published four volumes of reports with learned notes. Notwithstanding his good sense and remarkable industry, success at the bar came slowly, probably owing to a certain hardness of disposition and the lack of attractive personal qualities. It was not until he had been at the bar twenty-one years, in 1827, that he was made a King's counsel. From this time on, however, his promotion was rapid. In 1830 he entered Parliament, where his zeal, his capacity for hard work, and attention to details made him a valuable member and a useful supporter of the Whig Party. He devoted himself with characteristic energy and persistency to the amelioration of some of the harsh and cumbrous features of the law; and his name is asociated with several beneficial statutes of this character. He failed, however, in his favorite project of bringing about a general registry of land titles in England, such as exists in the United States, and this reform still remains to be effected in that country. In 1827 he was made the head of the great Real Property Commission, which made a searching inquiry into the state of the real property laws of England, and whose reports and recommendations have proved of inestimable value to subsequent generations of law reformers.

Campbell was an ardent supporter of Lord John Russell's first Reform Bill in 1831, was made Solicitor-General in 1832, and two years later was knighted and promoted to the post of Attorney-General. In the same year he was chosen the representative in Parliament for Edinburgh. He continued to represent Edinburgh down to 1841, and remained in the office of Attorney-General during that period, with the exception of the short time in 1835 when the Conservatives were in power. In 1841 he was made Chancellor of Ireland and a peer of the United Kingdom with the title of Baron Campbell of Saint Andrews, but held the office of Chancellor for only a few months, when the Melbourne Cabinet left office, necessitating his resignation. For the first time since boyhood, he found himself without regular daily labor, and at the mature age of 60 set to work to win the literary fame which he professes always to have secretly coveted. His first publication was a collection of his speeches at the bar and in the House of Commons. For three or four years after the publication of his speeches Campbell was engaged in the preparation of the *Lives of the Chancellors*, the first series of which appeared in 1845. In 1846 he joined the

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Russell Cabinet in the capacity of Chancellor of the Duchy of Lancaster. His ministerial duties were not sufficiently arduous to interrupt his literary labors, and he proceeded to complete the *Lives of the Chancellors*, and to publish a supplemental series of *Lives of the Chief Justices of England*. Both works have enjoyed great popularity, but leave no doubt that the author was more fitted for a practical lawyer than for a man of letters. Though executed in a sprightly manner, these writings are without grace of style and represent to a painful degree the envy, the prejudices, and the want of sympathy which were leading traits of Campbell's character. He returned to more congenial labors in 1850, when he was appointed to succeed Denman as Chief Justice. He held the office for nine years, at the end of which he received the Chancellorship of England. He died in June, 1861. His *Life* has been written by his daughter (1881).

CAMPBELL, JOHN (1840—). A Canadian scholar, born in Edinburgh, Scotland. He was educated at the University of Toronto and at New College, Edinburgh, distinguishing himself in both institutions. In 1868 he became minister of the Charles Street Presbyterian Church in Toronto, and in 1873 he was appointed professor of Church history and apologetics in the Presbyterian College, Montreal. He has contributed largely to learned societies and to Church reviews, and his work in theology and ethnology has been recognized both in America and in Europe. His chief single publication is *The Hittites: Their Inscriptions and Their History* (2 vols., 1890). For certain statements in an address on *The Perfect Father or the Perfect Book*, Professor Campbell was tried for heresy before the Presbytery of Montreal in 1893 and convicted. He, however, appealed to the Synod of Montreal and Ottawa and was sustained.

CAMPBELL, JOHN ARCHIBALD (1811-89). An American jurist. He was born in Washington, Ga.; graduated in 1826 at the University of Georgia, and was admitted to the bar in 1829. His legal ability was recognized by President Pierce, who, in 1853, appointed him associate justice of the United States Supreme Court, an office which he held until the outbreak of the Civil War. Subsequently he served as Assistant Secretary of War in the Confederate Government, and was one of the peace commissioners at the Fortress Monroe conference in 1865. After the war he was imprisoned at Fort Pulaski, but was released upon parole, and resumed his law practice.

CAMPBELL, JOHN FRANCIS, of Islay (*Iain Ileach*) (1822-85). A Scottish-Celtic scholar. He was born in Edinburgh, December 29, 1822, and was the eldest son of Walter Frederick Campbell and Lady Eleanor Charteris, eldest daughter of Francis, seventh Earl of Wemyss. He was educated at Eton and Edinburgh, and occupied several Government posts. He was a meteorologist of some distinction and invented an instrument for recording the intensity of the sun's rays. In 1865 he published *Frost and Fire, Natural Engines, Toolmarks and Chips, with Sketches Taken at Home and Abroad by a Traveler*, and in 1883 a book on *Thermography*. But he is chiefly remembered for his collections of Scottish Gaelic folk-tales and ballads. In 1860-62 he published his *Popular Tales of the West Highlands* in four volumes, and in 1872 he brought out an important volume of Gaelic ballads under the title, *Leabhar na Feinne*. The tales were taken down conscientiously from the mouths of the people, and constitute the most valuable collection of the sort that has yet been made in any of the Celtic countries. The *Leabhar na Feinne* brings together all the accessible Scottish Gaelic ballads on Ossianic subjects. It was Campbell's intention to publish other volumes containing other cycles of ballads, but the plan was never carried out.

CAMPBELL, JOHN MCLEOD (1800-72). A Scotch theologian. He was born at Kilninver, and studied in Edinburgh and Glasgow from 1811 to 1821, when he was licensed. He was inducted into the parish of Row in 1825, and after a trial by the Assembly for heresy in his doctrines regarding the Atonement, was deposed in 1831. From 1833 to 1859 he preached to an independent congregation in Glasgow. His chief work is the *Nature of the Atonement, and Its Relation to Remission of Sins and Eternal Life* (1856, 4th ed. 1873), which has had a more than slight influence upon Scottish religious thought. His further publications include *Thoughts on Revelation* (1862).

CAMPBELL, THOMAS (1777-1844). An English poet, born in Glasgow July 27, 1777. He was educated at the University of Glasgow, where he was distinguished for his knowledge of Greek literature. In 1795 he went as tutor to Sunipol on the island of Mull. The scenery of the western Highlands, which made a deep impression on his mind, is reflected in his verse. Returning from Mull, he repaired to Edinburgh with the intention of studying law. This plan he, however, soon abandoned for literature. His first poem, *The Pleasures of Hope*, suggested to him while at Mull, was published in 1799, and went through four editions in a twelvemonth. After its publication, Campbell went to Germany, visiting Munich, Leipzig, and Hamburg, where he was staying at the time of the battle of Hohenlinden. During this period he wrote *The Exile of Erin* and *Ye Mariners of England*. Returning to Edinburgh, he published, in 1801, *Lochiel's Warning* and *Hohenlinden*. In 1803 he proceeded to London, and adopted literature as a profession. In 1805, through the influence of Fox, he was granted a royal pension of £200 a year. In 1809 appeared *Gertrude of Wyoming*, which bears the same relation to *The Pleasures of Hope* that Thomson's *Castle of Indolence* bears to *The Seasons*—a less brilliant and striking, but more mature and finished performance. In 1819 he published his *Specimens of British Poets*, containing an excellent introductory essay on poetry, and good biographies of the poets themselves. At this very time he was also delivering lectures on poetry. After this he edited the *New Monthly Magazine*, contributing to it several poems, among which is *The Last Man*. In 1824 he published *Theodoric, and Other Poems*. In 1826 he was elected Lord Rector of the University of Glasgow, and he received the unusual honor of reelection in the two following years. He published *The Pilgrim of Glencoe and Other Poems* in 1842. His later publications added nothing to his fame. He died in Boulogne, France, June 15, 1844, and was buried in Westminster Abbey. Campbell's verse is unequal in quality, but it is usually

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graceful. His lasting fame rests on *Hohenlinden* and the patriotic lyrics *Ye Mariners of England* and *The Battle of the Baltic*. Consult: Beattie, *Life and Letters of Thomas Campbell* (London, 1840); Redding, *Literary Reminiscences of Campbell* (London, 1860); *Poetical Works*, edited by Hill, with *Life* by Allingham (London, 1891).

CAMPBELL, WILLIAM (1745-81). An American soldier, prominent as a militia officer in the Revolutionary War. He was born in Augusta County, Va., and received a good education. In 1767 he removed to the Holston Valley with his mother and four sisters, and in 1773 became one of the first justices of the peace in Fincastle County. He served under Colonel Christian in Lord Dunmore's War (q.v.) in 1774, joined Patrick Henry's Virginia forces in September, 1775, and in July, 1776, assisted in forcing Governor Dunmore from Gwynn's Island. Returning to the Holston Valley, he became lieutenant-colonel of militia in 1777, was a member of the commission appointed in 1778 to run the boundary line between Virginia and the Cherokees in accordance with a recent treaty, and in the following year was prominent in various partisan operations against the Tories. He served for some time in the Virginia House of Delegates, but, obtaining a leave of absence in June, 1780, took an active part in numerous contests with the Tories, and in the famous battle of King's Mountain (q.v.) on October 7, was the leader of the American forces. Early in 1781 he joined General Greene, and on March 15 took a conspicuous part in the battle of Guilford Court-House (q.v.); but resenting the failure of Colonel Lee, commanding the cavalry, to come to his aid at a critical moment in this action, he withdrew in disgust from the service. He then again became a member of the House of Delegates, but in June was appointed brigadier-general of militia, and served under Lafayette until his death in August. Lafayette said of him: "The glory which General Campbell acquired in the affairs of King's Mountain and Guilford Court-House will do his memory everlasting honor, and insure him a high rank among the defenders of liberty in the American cause." Consult a sketch in Draper, *King's Mountain and Its Heroes* (Cincinnati, 1881).

CAMPBELL, WILLIAM, Lord (? -1778). The last English Governor of South Carolina, the youngest son of the fourth Duke of Argyll. He became a captain in the British Navy in 1762; was a member of Parliament in 1764, was Governor of Nova Scotia from 1766 to 1773, and in 1775 became Governor of the Province of South Carolina. Here, on the outbreak of the Revolution, he was active in stirring up the Indians against the Colonists, who forced him to take refuge on a British man-of-war. In 1776, during the British attack upon Fort Moultrie, he received a wound while aboard Sir Peter Parker's flagship, which afterwards resulted in his death.

CAMPBELL, WILLIAM WILFRED (1861—). A Canadian poet, born in Berlin, West Ontario, His father, Thomas Swainston Campbell, and his paternal grandfather were both clergymen of the Church of England. His mother was a daughter of Major Francis Wright, of Walworth Manor House, Surrey, England. Educated in Toronto and in Cambridge, Mass., Campbell was ordained to the Episcopal ministry (1885), and after some experience in a New England parish, he became rector in Saint Stephen, New Brunswick (1888). In 1891 he resigned and removed to Ottawa, where he obtained a place in the civil service. In 1889 Campbell won attention by his fresh and musical *Lake Lyrics and Other Poems*. His way from descriptive verse to intenser lyrical expression is marked by *Beyond the Hills of Dreams* (1899). This volume contains several impassioned poems on patriotic and imperial themes; such as "Victoria," "England," "The World Mother," and "The Lazarus of Empire." Campbell has written a number of literary dramas, of which *Mordred* and *Hildebrand* were published together in 1895. See CANADIAN LITERATURE.

CAMP'BELL-BAN'NERMAN, Sir HENRY (1836—). A British politician, representing the Sterling district, Scotland, since 1868, and since February, 1899, Liberal leader in the House of Commons. He was born September 7, 1836, and is the younger son of the late Sir James Campbell, of Stracahthro, Forfarshire. His additional surname was assumed under the will of a maternal uncle, Henry Bannerman of Kent. He has received the M.A. degree from Cambridge and the honorary LL.D. from the University of Glasgow. Besides the county offices of justice of the peace and deputy lieutenant, he has held various positions in the Government. In 1871-74 and again in 1880-82 he was financial secretary to the War Office; secretary to the Admiralty, 1882-84; Chief Secretary for Ireland, 1884-85; and Secretary of State for War, 1886, 1892-95. In 1899 he was chosen leader of the Liberal Party in succession to Sir William Harcourt. In 1901 he became a member of the Civil List Committee.

CAMPBELL ISLAND. A lonely spot in the south Pacific, in latitude 52° 33′ S. and longitude 169° 9′ E. Though it is mountainous and measures only 36 miles in circumference, yet it is valuable on account of its harbors (Map: World. Western Hemisphere, P 2). It belongs to New Zealand, and is used as a provision depot, but is not permanently inhabited. It is also scientifically interesting, being volcanic, and displaying a rich and varied flora.

CAMPBELLITE. See CRAPPIE.

CAMPBELLITES, THE. (1) A religious denomination founded in the United States by the Rev. Alexander Campbell (q.v.). Once called the New Lights, they are still variously known as the Christian Church, the Church of Christ, and even the Reformers, though the name preferred by them is Disciples of Christ. (2) The followers of the Rev. John McLeod Campbell (q.v.), who in 1831, because of difference of faith about the Atonement, left the Church of Scotland. See DISCIPLES OF CHRIST.

CAMPBELTOWN. A royal burgh and seaport on the east coast of the peninsula of Kintyre, in Argyllshire, Scotland, 65 miles west-southwest of Glasgow, on a fine harbor or sea-loch (Map: Scotland, C 4). A sculptured granite cross stands in the principal street, and is supposed to have been brought from Iona. The town is famous for its whisky distilleries, and imports large quantities of barley. Coal is found in the vicinity. Its fisheries are important. Campbeltown is a favorite summer resort.

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Population, in 1901, royal burgh, 5285; Parliamentary burgh, 8234; civil parish, 10,236.

CAMP-BIRD, or ROBBER. The Canada jay. See JAY.

CAMPE, käm'pe, JOACHIM HEINRICH (1746-1818). A German teacher, lexicographer, and writer for children. He studied theology in Halle, and became a warm partisan of the educational reforms of Basedow (q.v.), whose place he took during the year 1777 as the head of the Philanthropenum in Dessau. A little later he devoted himself to the writing of educational works, and also built up a prosperous business as a publisher of pedagogical works. In 1787 he was appointed to reform the system of instruction in the Duchy of Brunswick. In 1789 he visited Paris and became an ardent advocate of the principles of the Revolution. His juveniles, all written for the purpose of instruction, comprise thirty-seven volumes. His *Robinson der Jungere* ("Robinson the Younger") has been translated into many languages. He also published some lexicographical works.

CAMPEADOR, käm'pâ-â-dôr'. An epithet used of warriors. In particular, a title of the Cid (q.v.).

CAMPECHE, *Mex. pron.* kâm-pā'châ. One of the Atlantic States of Mexico, occupying the south part of the peninsula of Yucatan, and bordering on Guatemala and the Gulf of Campeche (Map: Mexico, O 8). Its area is 18,087 square miles. The soil is for the most part sandy and unproductive, but there are good pasture-lands. The main products are rice, sugar, and salt. Population, in 1879, 90,413; in 1895, 88,302. The Indians form a considerable portion of the population.

CAMPE'CHE, or **CAMPEA'CHY.** The capital of the Mexican State of the same name, and a seaport town, situated on the Gulf of Campeche, in the Gulf of Mexico, at the mouth of the San Francisco River (Map: Mexico, O 8). The industries of Campeche are unimportant with the exception of shipbuilding, but it is the centre of the trade in Campeche wood, and also in wax. Its harbor is sheltered by a breakwater, but is too shallow for vessels of deep draught. The town has a college and a population of 17,000.

CAMPEGGIO, kâm-pĕj'ô, or **CAMPEGGI,** kâm-pĕj'ê, LORENZO (1474-1539). An Italian prelate. In early life he was a lawyer, but after losing his wife he became an ecclesiastic and rapidly rose to the position of cardinal. In 1519 he was sent to England to preach a crusade against the Turks, but was unsuccessful. Henry VIII. made him Bishop of Salisbury in 1524, and he came again to England in 1528 to assist Wolsey in the case of Henry's divorce from Catherine. His efforts to bring about a reconciliation came to nothing, however, and the see of Salisbury was taken from him. At Nuremberg, in 1524, Campeggio tried to win back Luther to the Catholic Church. At the Diet of Augsburg, in 1530, he advised Charles V. to adopt a relentless policy toward the Protestants of Germany.

CAMP EQUIPAGE. Articles and materials necessary for the proper equipment of a camp. It includes, among other things, tents, furniture, fittings, cooking utensils, and articles of common use. The description and quantity of camp equipage will depend on the purpose and location of the camp, its permanent or temporary character, and the number of troops accommodated.

CAMPER, käm'pĕr, PIETER (1722-89). A Dutch anatomist and naturalist. He was born in Leyden, and studied medicine there. In 1750 he became professor in Franeker; in 1755 in Amsterdam; and in 1763 in Groningen, where he remained until 1773. On being elected a member of the State Council in 1789, he removed to The Hague, where he died. He was distinguished for the services he rendered both to human and comparative anatomy, to surgery, obstetrics, and medical jurisprudence, and was a skillful draughtsman. His collected writings, with plates, appeared under the title, *Œuvres qui ont pour objet l'histoire naturelle, la physiologie et l'anatomie comparée* (3 vols., Paris, 1803). For his observations on the facial angle, see ANGLE.

CAM'PERDOWN (Dutch, *Camperduin,* Downs of Kamp). A broad tract of low downs which borders the North Sea on the west side of the peninsula which separates it from the Zuyder Zee (Map: Netherlands, C 2). It takes its name from the neighboring hamlet of Kamp, about 25 miles north of Haarlem. It gives its name to the victory obtained off that part of the coast by the British Admiral Duncan over the Dutch fleet, October 11, 1797.

CAMPERIO, käm'pâ-rē'ô, MANFREDO (1826-99). An Italian traveler, born in Milan. He traversed Turkey, visited Australia and the Sunda Islands, and upon the opening of the Suez Canal explored the Nile as far as Assuan, went thence to the East Indies, Ceylon, and Java, and, in the service of the Society for the Commercial Exploration of Africa, founded by him in 1879, traveled through Tunis, Tripoli, and Bengasi. He established, in 1876, the review *Esploratore.* Besides articles in periodicals he published *L'Eritrea nel XX. secolo* (1899), in which he urges the necessity of railway construction in the colony.

CAMPERO, kâm-pā'rô, NARCISO (1815—). A Bolivian soldier and politician, President of Bolivia from 1880 to 1884, born at Tojo (now in Argentina). He became a brigadier-general in the Bolivian Army, and for a brief period in 1872 was Minister of War. Upon the overthrow of Daza, he was elected President on April 9, 1880. He assumed command of the combined armies of Bolivia and Peru, but on May 26, 1880, was routed at Tacna. His administration, a tranquil one so far as concerned internal affairs, came to an end on August 1, 1884.

CAMP FOLLOWERS. Sutlers, servants, dealers in small wares, and sometimes natives of the vicinity, who travel with, or follow in the train of, an army on the march. They are invariably a source of trouble and responsibility to the commander of the army to which they attach themselves, and are often a source of danger.

They are not so much in evidence in modern campaigns as in the past, unless the campaign is being conducted in a wild or uncivilized country. Formerly, owing to the absence of railroads and steamships, armies had frequently to undertake long marches, with practically no base of supplies, or at the best having very meagre communication with such base, rendering necessary the carrying of great quantities of stores and supplies. Natives were employed for this

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work, and in instances where the roads were to be constructed or were in need of repairs, would also be used for that purpose. It is recorded that in February, 1839, when a Bengal army of 15,000 men left Shikapur for Afghanistan, it was accompanied by at least 85,000 camp followers.

In European countries, and in modern times, the presence of railroads, obviates a certain amount of marching, and in conjunction with steamships keeps the army well supplied, rendering any large number of camp followers unnecessary. Those who do exist, however, are provided for in regulations, are subject to the articles of war, and are under the control of the commanding officer.

CAMPHAUSEN, kämp'hou-zen, OTTO (1812-96). A Prussian statesman. He was born in Hünshoven, studied at the universities of Bonn, Heidelberg, Munich, and Berlin, in 1844 was elected councilor at Treves, and in 1845 became a member of the Ministry of Finance. In 1869 he was appointed Finance Minister. His administration, resourceful and cautious, marked a change from conditions of economic depression to those of great prosperity. Made accountable by his opponents for a subsequent reaction, attacked by even the Liberals, and at odds with Bismarck respecting the tobacco tax, he resigned with rank of Minister of State.

CAMPHAUSEN, WILHELM (1818-85). A German painter. He was born in Düsseldorf, and was a pupil at the academy there. His specialty was battle scenes. Among his works are: "Tilly at Breitenfeld" (1841); "Prince Eugene at Belgrade" (1843); "Godfrey of Bouillon at Ascalon" (1845); "Puritans Watching the Enemy" (1846); "Charles II. in the Retreat from Worcester" (1849); "Charles I. at Naseby" (1851); "Blücher Meeting Wellington" (1857); "Napoleon III. at Sedan;" "Meeting Between Bismarck and Napoleon III.;" and "Entry of Emperor William into Berlin" (1872). Camphausen was professor at the Düsseldorf Academy from 1859 until his death.

CAMPHINE, kăm-fēn' (*Camphor* + *ine*). The name applied to purified oil of turpentine, which has been used for burning in lamps. It is very volatile, and burns very freely, giving a white, brilliant light. With air its vapors form a dangerously explosive mixture.

CAMPHOR (Med. Lat. *camphora*, from Ar. *kāfūr*, camphor, which is derived through the Prākrit *kāpūra*, from Skt. *karpūra*, camphor), $C_{10}H_{16}O$. A substance obtained by the action of steam on the chipped wood of the camphor-tree (*Camphora officinarum*, or *Cinnamomum camphora*, Nees). The product of distillation with steam is freed from volatile oil by draining and pressing, and the crystalline mass remaining behind is purified by sublimation. Camphor has also been prepared artificially by oxidizing the hydrocarbon camphene, $C_{10}H_{16}$. Pure camphor is a colorless, transparent, crystalline substance, melting at 175° C. and boiling at 204° C. It has a characteristic odor and a somewhat pungent, aromatic taste. It is only sparingly soluble in water, but dissolves readily in alcohol, ether, chloroform, carbon disulphide, and other organic liquids. It has a tough consistency, but if digested with alcohol becomes hard and may then be readily pulverized. Camphor was introduced into Europe by the Arabs. It is now employed in the manufacture of celluloid and of explosives, and is often used in medicine. It forms an ingredient of various liniments and is often applied externally in gout and chronic rheumatism and to relieve pain in neuralgia; it is commonly administered internally as a remedy for a nervous cold in the head. It is generally known as *common* or *Japan camphor*. Borneol, or Borneo camphor, is described in a separate article.

CAMPHORIC ACID, $C_8H_{14}(COOH)_2$. An organic substance obtained by the oxidation of camphor with nitric acid. It occurs in needle-shaped crystals, colorless, odorless, and of slightly acid taste. It is nearly insoluble in cold water, but dissolves readily in hot water as well as in alcohol, ether, fatty oils, and other organic liquids. Camphoric acid has been used in inflammatory conditions of the respiratory and urinary mucous membranes, but is now employed almost exclusively as an anhidrotic (q.v.). It proves most serviceable in the profuse night-sweats of phthisis.

CAMPHUYSEN, kämp'hoi-zen, DIRK RAFELSZ (1586-1627). A Dutch theologian and poet, born at Gorkum. He was a partisan of Arminius and was persecuted on that account. Among his works is a compendium of his doctrines. He also left a number of religious poems, including a translation of the Psalms. He is said to have been a painter until his eighteenth year. The pictures attributed to him are probably by his nephew, RAPHAEL CAMPHUYSEN (1598-1657), an artist, or by his other nephew, Raphael's brother, GOVAERT CAMPHUYSEN (1624-74), a painter. His works usually are landscapes with animals done in Paul Potter's style, and have been taken for that master's. They are to be found in Dutch museums and in private collections.

CAMPI, käm'pê, ANTONIO, BERNARDINO, GIULIO, or VINCENZO. See CAMPI, GALEAZZO.

CAMPI, GALEAZZO (1475-1536). An Italian artist, born in Cremona. He was the founder of a family of painters, but attained little reputation himself. His son GIULIO, however, born in Cremona (1500-72), and pupil of Giulio Romano, led the Eclectic School in seeking to unite the best qualities of the Roman and other Italian schools. He studied the works of Titian, Raphael, and Giorgione, and his paintings are remarkable for vigor and beauty of coloring. His best works are in Cremona, Milan, and Mantua. Of the brothers whom he instructed, ANTONIO CAMPI excelled also as an architect; his best picture, that of "Saint Paul Resuscitating Eutychus," was engraved by Agostino Caracci.—VINCENZO CAMPI, who died in 1591, devoted himself to pictures of still life, but his work was much inferior to that of his brothers.—BERNARDINO CAMPI, a third brother, was born in Cremona, 1522, and died about 1592. He was also a pupil of Giulio and the greatest of the Campi. He was later instructed by Ippolito Corta, and then went to Parma and Modena to study the style of Correggio. He had wonderful skill in imitating the works of Titian. Of his original work, the best representation is a painting in the Church of San Gismondo in Cremona. Of the Cremonese artists of their time, the Campi ranked first, though their style was mainly mechanical.

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CAMPIDOGLIO, kȧm'pē-dō'lyō (It., Capitoine Hill, Lat. *Capitolium*). The Piazza di Campidoglio, with the famous group of palaces erected from Michelangelo's designs, occupies a depression on the Capitoline Hill in Rome between the two peaks of the Citadel and the Temple of Jupiter. The edifices consist of the Palace of the Senator, opposite the grand flight of steps leading up from the Piazza Araceli, and the Palace of the Conservators and the Capitoline Museum on either side. In the centre of the Piazza di Campidoglio stands a splendid antique equestrian statue in bronze of the Emperor Marcus Aurelius.

CAMPINAS, or SÃO CARLOS DE CAMPINAS, soun kär'lōs dȧ kȧm-pē'nȧs (Portug., plains). A town of Brazil on the Piracicaba, 70 miles northwest of São Paulo (Map: Brazil, H 6). There are large coffee and sugar plantations in the surrounding district. Population, 12,000.

CAM'PION. See LYCHINIS; SILENE.

CAM'PION, EDMUND (1540-81). An English Jesuit. He was born in London, was educated at Oxford, and in 1567 was ordained deacon, but as he could not consent to the Protestant formulary as required by the English Church, he went to Ireland, where it was expected that the University of Dublin would be revived. That plan failing, he went (1571) to Douai, and there joined the Society of Jesus (1572). In 1580 he returned to England as a missionary. The next year he published *Decem Rationes*. For this he was arrested, committed to the Tower, tortured several times on the rack, subjected to prolonged disputations, for which he had no time to prepare himself and could use no books, was tried for treason and convicted by hired witnesses, and was hanged at Tyburn, London, with several laymen. Consult Simpson, *Edmund Campion: A Biography* (London, 1867).

CAMPION, THOMAS (? -1619). An English poet and musician, about whose life almost nothing, not even the date of his birth, is known. He appears to have traveled on the Continent, and to have received the degree of M.D. in a foreign university. In 1595 he published a volume of Latin elegiacs and epigrams, under the title *Poemata*. He ridiculed rhyme in the *Art of English Poesie* (1602); composed many masques for the Court of King James I., and became an authority on music, publishing four books of airs, songs with accompaniments (1610-12). For his masques, consult Nichols, the *Progresses*, etc., of Queen Elizabeth and of King James I. (London, 1788-1828).

CAMPISTRÔN, kȧn'pēs'trôn', JEAN GALBERT DE (1656-1723). A French dramatic poet. He was born in Toulouse, and at an early age went to Paris, where he became a follower of Racine. His works have neither well-marked character nor striking situations, but many of his tragedies were produced with success for several years. Among his best-known works are *Virginie* (1683); the libretto for Lully's opera, *Acis et Galatée* (1686); *Andronic* (1685), which has the same historical background as Schiller's *Don Carlos;* and *Tiridate* (1691). The best edition of his works is that of 1750 (3 vols.), which contains memoirs of his life. *Œuvres choisies* (Paris, 1810) were published by Auger. In 1701 he was received into the French Academy.

CAMP-MEETING. A series of religious meetings held in the open air, usually in the woods, and participated in by families or groups of persons from a distance, who live in tents or in simply built houses during the sessions and devote the greater part of the time to listening to preaching, which is always direct and fervent and is usually accompanied by a 'revival.' The first held in the United States was in 1799, at a settlement on Red River, in Kentucky, and was the outcome of the preaching of Rev. John M'Gee, a Methodist, his brother, a Presbyterian, and Rev. Mr. Hoge, also a Presbyterian, at a communion service. Their exhortations affected their audience so strongly that crowds came from the surrounding country to hear confessions and 'testimonies,' and the meeting, transferred from the small meeting-house to the adjoining forest, was protracted for several days, and was followed by others in different places. The number of persons attending one camp-meeting in Kentucky was estimated at 20,000. At first Presbyterians and Baptists united with the Methodists in holding these meetings, but they soon came to be confined to the last-named denomination, which in all its branches has been most enthusiastic in supporting them and in introducing them into all parts of the country, though even within the denomination they have met with opposition. In many States camp-meetings have lost some of the characteristics of early days, the places of meeting being fixed, and the life less simple. Not unfrequently secular instruction is a feature, schools of languages, music, art, etc., and lectures on various topics, filling the time not occupied by religious services. Among the many popular camp-meeting grounds of the Methodist Episcopal Church are Round Lake, N. Y., Ocean Grove, N. J., Martha's Vineyard, Mass., Lakeside, Ohio, Bartley, Neb., and Pacific Grove, Monterey, Cal.

Lorenzo Dow (q.v.) introduced camp-meetings into England in 1807, but the Wesleyan Conference refused (as it still does) to sanction them, and to this attitude was partly due the organization of the Primitive Methodist denomination in 1810. Consult: *An Essay on Methodism* (New York, 1849); J. Porter, *Revivals of Religion* (1877); S. C. Swallow, *Camp-Meetings* (1878).

CAMPOAMOR Y CAMPOOSORIO, kȧm'pō-ȧ-mōr' ē kȧm'pō-ō-sō'rē-ō, RAMON DE (1817-1901). A Spanish poet, politician, and philosopher. He was born in Navia, September 24, 1817, and received a classical education in Santiago and at the Jesuit College of Saint Thomas in Madrid, which he left without finishing his course. He then began the study of medicine at the College of San Carlos, but abandoned it to devote himself to journalism and literature. Throughout his life, however, he kept a strong interest in physiological and physical science, and especially in chemistry. He entered political controversy with the *Historia crítica de las Cortes reformadoras* in 1837; was several times elected to the Cortes, where he distinguished himself as an orator; was appointed Governor of Alicante and Valencia in 1854; and engaged in a long controversy with Castelar which is represented by his *Polémicas con la democracía* (1862). He took no part in politics from the Revolution of 1868 until the succession of Alfonso XII. in 1874, after which he held several subordinate offices, was made counselor of state, and later life Senator. He

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refused the title of Grande de España. His attitude in politics was always that of a moderate conservative, distinguished for his eloquence and his chivalric faithfulness to the royal family.

His trend toward philosophical thought was shown in *La filosofía de las leyes* (1846), and confirmed in *El personalismo* (1850 and 1855); he attempted to expound his system in *Lo absoluto* (1862 and 1865) and *El idealismo* (1883), the two works by which he is best known outside of Spain. His philosophy is a somewhat incoherent and often self-contradictory eclecticism, tending on the whole to subjective idealism.

By far his most important work was done in poetry. Lightness, grace, and delicate sensibility marked his early verse: *Los ayes del alma* (1842), and *Ternezas y flores* (1858). The *Fábulas morales y políticas*, first published in 1842, were added to in many successive editions. His most characteristic short poems are to be found in the *Doloras* (1856-90, 18 editions, each containing new work), which created a new type of poem much imitated by the younger Spanish poets. These poems condensed into brief lyric form the expression of philosophical, ethical, and social ideas, treated sometimes with bitter irony, but always with feeling. He attempted long narrative poems in his epic on Columbus (*Colon*, 16 cantos, 1853 and 1857), and *El drama universal* (1873), but these are less successful than the shorter narratives, which contain some of his best work: *Los pequeños poemas* (1879, 1886); *Los buenos y los sabios* (1881); *El amor y el rio Piedra* (1882); *Los amores de Juana* (1882); *El trén express* (1885); *Nuevos pequeños poemas* (1887); *Humoradas* (1890). *La niña y el nido*, *Los grandes problemas*, and *Por donde viene la muerte*, are among the best. He also wrote many plays in verse, none of which succeeded on the stage. They are full of humor and feeling, and rich in ideas, but are lacking in dramatic movement. The best known are: *Una mujer generosa* (1838); *Dies Irae* (1873); *El honor* (1874); *Guerra á la guerra; Así se escribe la historia* (1875); *Glorias humanas* (1885); *Cuerdos y locos* (1887); *El Palacio de la verdad*, etc. He published his theory of poetry in *La poética* (1883), completed in a new edition (1890), and in *La metafísica y la poética* (1891). His last poems of importance are *El licenciado Torralba*, a philosophico-ethical narrative poem, and *Nuevos poemas* (1892). He became a member of the Spanish Academy in 1861.

Campoamor's narrative poetry at its best may be compared with that of Victor Hugo. In his usual choice of subjects he rather resembles Coppée, to whom, however, he is distinctly superior in conception and treatment. In poems of sentiment and thought, such as the *Poesías y fábulas*, and the *Doloras*, he has close affinity with Sully-Prudhomme, and the *Licenciado Torralba* attempts the same task as Sully-Prudhomme's *Bonheur*. In spite of these relations, he is the most original and independent of Nineteenth Century Spanish poets, and is by many considered the greatest of the last half-century. He is the poet of subjectivity *par excellence* in all Spanish poetry, and finds fit lyric expression for thought as do few poets of any country.

His *Obras completas* were edited by Montaner y Simon (Barcelona). Selections from his poetry were published (Madrid, 1879, and Leipzig, 1885). Consult: Juan Valera, *Estudios Críticos* (Madrid, 1864); Fr. Giner, *Estudios literarios* (Madrid, 1866); Melchior de Palau, *Acontecimientos literarios* (1889).

CAMPOBASSO, käm'pô-bäs'sô (It. *campo*, Lat. *campus*, field + *basso*, Late Lat. *bassus*, low). A city in South Italy, capital of the Province of Campobasso, 52 miles north of Benevento, on the east slope of Monteverde, in the heart of the Apennines, 2400 feet above the sea (Map: Italy, J 6). The climate is cool and healthy and the town has a ruined castle and walls, a cathedral, a theatre, excellent institutions of learning, important manufactures of cutlery, and a famous market to which good roads lead from the surrounding country. Population, in 1881, 15,000; in 1901, 15,030.

CAM'POBEL'LO (It. *campo*, Lat. *campus*, plain + *bello*, Lat. *bellus*, beautiful). An island of New Brunswick, Canada, situated just outside of the Maine, United States, boundary, at the mouth of Passamaquoddy Bay, an inlet of the Bay of Fundy, in latitude 44° 57′ N., and longitude 66° 55′ W. (Map: New Brunswick, C 5). The island, from nine to ten miles long, and from two to three miles wide, has a picturesque coast abounding in fiords, chasms, cliffs, and pleasant beaches. At the north end is a lighthouse 60 feet in height. The well-wooded interior is intersected in all directions by fine walks and drives. It contains copper and lead ores, but the industrial portion of the population is chiefly engaged in fisheries, and during the season in attending to the wants of the residents of the numerous summer homes and hotels, some of the best along the Atlantic coast. The island's development dates from its acquisition by a syndicate of Boston and New York capitalists in 1880. From 1767 it had been in the possession of Admiral William Owen's family. The United States is represented by a consular agent. Permanent population about 1200.

CAMPO-FORMIO, käm'pô fôr'myô, now officially written CAMPOFORMIDO. A village in the Province of Udine, northern Italy, about 7 miles southwest of the city of Udine. It is celebrated for the treaty of peace concluded there, October 17, 1797, between Austria and the French Republic. After overrunning Italy, Bonaparte had crossed the Alps, and threatened Vienna. Austria therefore hastened to arrange preliminaries of peace at Leoben, April 18, 1797. In the treaty which was concluded by Bonaparte with the Count von Cobenzl at Campo-Formio, Austria ceded the Belgian Netherlands to France, and gave up Lombardy, to be incorporated into the Cisalpine Republic, and received as compensation most of the territories of the Republic of Venice (which Bonaparte had extinguished), including Venetia (with the city of Venice), Venetian Istria, and Dalmatia. France took the remaining territory of Venice, its possessions in Albania, and the Ionian Islands.

CAMPO MAJOR, käN'pô mä-zhôr'. A city in the Province of Alentejo, Portugal, 11 miles northeast of Elvao (Map: Portugal, B 3). It is situated at an elevation of about 950 feet, has a meteorological observatory and manufactures wine and woolen goods. It was the scene of a siege in 1811 during the Peninsular War, which has been celebrated by Scott. Population, in 1890, 5846.

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CAMPOMANES, käm'pô-mä'nâs, PEDRO RODRIGUEZ, Count (1723-1802). A Spanish statesman and political economist. He was born in Asturias. His talents and learning were devoted to the advancement of his native country. He acquired a high reputation for legal attainments and was appointed fiscal and subsequently president of the Supreme Council of Castile. He held other high offices, among them that of director of the Royal Academy of History in Madrid. By his enlightened view of state policy as well as by his writings, which gave him a place among the most eminent Spanish authors, he obtained a great reputation throughout Europe. His attention was chiefly devoted to economic studies. He pointed out how the impoverishment of Spain was due to oppressive laws, that tended to discourage commerce and industry. He gave effectual assistance to Count Aranda in his difficult enterprise of driving the Jesuits out of Spain. Campomanes was a man of great intelligence and the highest probity, and gained the affection and admiration of all his associates. At the suggestion of Benjamin Franklin, Campomanes was chosen an honorary member of the Philosophic Society of Philadelphia. His chief works are: *Antigüedad marítima de la republica de Cartago* (Madrid, 1756); *Discurso sobre el fomento de la industria popular* (1771); *Discurso sobre la educación popular de los artisanos* (1775); and *Tratado de la regalia de amortización* (1765).

CAMPORI, käm-pō'rê, CESARE, Marquis (1814-80). An Italian historian, born in Modena. His masterpiece is the exhaustive biography, *Raimondo Montecuccoli, i suoi tempi e la sua famiglia* (Florence, 1876). A collection of his works was published posthumously under the title of *Memorie patrie, storiche e biografiche* (Modena, 1882). Consult Matteo Ricci, "Cesare Campori," in *Ritratti e profili politici e litterarii* (Florence, 1880).

CAMPOS, käm'posh (Portug., plains, Lat. *campus*, field). A city of Brazil, in the State of Rio de Janeiro, on the Parahyba River, which is navigable for small steamers to this point, about 30 miles from its mouth (Map: Brazil, J 8). It has good railroad connections, and canals extend to the coast. The city is lighted by electricity and contains several fine buildings. It controls an important trade as the centre of a fertile region producing sugar-cane, coffee, rice, and cotton, and has a number of sugar-refineries. Campos was founded in 1730. Population, in 1890, 78,036, one-half of whom are negroes.

CAMPOS. The Brazilian term for tropical prairies or savannas. Campos in which trees are common are called 'campos cerrados.' See GRASSLAND and SAVANNA.

CAMPOS, ARSENE MARTINEZ. See MARTINEZ CAMPOS.

CAMPO SANTO, käm'pô sän'tô (It. *campo*, Lat. *campus*, field + *santo*, Lat. *sanctus*, holy). The Italian designation of a cemetery or burying-ground, but more especially for an inclosed place of interment, surrounded internally by an arcade, for the burial of persons of distinction. See CEMETERIES.

CAMPOS SALLES, käm'posh sä'lĕsh, MANOEL FERRAZ DE (1841—). A South American politician, and President of Brazil, born in São Paulo. He was admitted to the bar, was elected in 1867 and frequently thereafter to the Legislature of São Paulo, and in 1884 became a member of the Chamber of Deputies. As Minister of Justice, upon the proclamation of the Republic, he thoroughly reorganized the Brazilian system of law along lines subsequently accepted by the Constituent Assembly. In 1898 he was elected President of Brazil, as candidate of the Republican Party.

CAMPO VACCINO, käm'pô vä-chē'nô. See FORUM ROMANUM.

CAMPRODON, käm'prô-dōn', FRANCISCO (1816-70). A Spanish dramatic poet. He was born at Vich, Barcelona, and first attracted attention by his poem *La Tornada de Titó*, written in the Catalan dialect, upon the return of the Spanish Army from the African War. Some of his dramas are adaptations from foreign works. The most important original one is *Flor de un dia* (1851).

CAMP'TONITE (named after Campton, N. H., where the first specimen was found). A term applied to certain igneous rocks of the nature of diorite, which occur in fissures in other rocks—i.e. in dikes. They are composed chiefly of hornblende and plagioclase, the former mineral being sometimes replaced by biotite. Iron ores and quartz are also usually present. The chemical composition of camptonite does not differ from that of diorite.

CAMP'TOSAU'RUS (Neo-Lat., Gk. καμπτός, *kamptos*, bent + σαῦρος, *sauros*, lizard). A genus of herbivorous, bird-footed dinosaurs of which remains are found in the Jurassic rocks of Wyoming. The genus is closely allied to the fossil genus Iguanodon of the European Jurassic, which it much resembles. The animal was lightly built, and as its five-toed fore limbs were small and apparently of little use in locomotion, it must have progressed on its three-toed hind limbs after the fashion of a bird. Its neck was rather short, but slender and bird-like, and its small head was provided with a horny beak. The tail was long and heavy. Three species have been recognized; of these the largest, *Camptosaurus amplus*, had a length of 30 feet and a height of 15 feet. See DINOSAURIA.

CAMPULUNG, käm'pōō-lōōng', or KIMPOLUNG. A town of Rumania, capital of a circle, situated on a small tributary of the Arjish. It forms the terminus of the railway line from Coleschi and had a population of 13,033 in 1899.

CAMPUS (Lat., field). In Roman times, a vacant space in or near a city, used for public shows, combats, etc. There were eight around Rome, of which the Campus Martius (Field of Mars) was the most important. It was outside the walls, occupying the level space between the Pincian, Quirinal, and Capitoline hills on the east, and the Tiber on the west. In later times this space was much reduced by private buildings, and the name was limited to the space between the river, the Circus Flaminius, and the Via Iata. In this met the *Comitia Centuriata* and the *Comitia Tributa;* and in it was the public hall for the use of the magistrates and foreign ambassadors, who were not permitted to enter the city, and the *Ara Martis* (Altar of Mars). In later times it became a pleasure ground, with shaded walks, gardens, baths, theatres, and a race-course. Julius Cæsar began the change, by

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erecting a stone building for the voting of the people, but Agrippa did most for the place by erecting many structures, among them his baths and the original Pantheon; and Augustus added his own mausoleum and the Ara Pacis. Later emperors crowded this particular campus with public buildings and private residences. It was certainly not within the *pomerium* before the time of Hadrian, but whether it was included by him or by Aurelian is uncertain. The district in which the old Campus was situated is now called Campo Marzo. Another ancient campus was the Sceleratus, the polluted field, where Vestals who had been untrue to their vows of chastity were buried alive. The open grounds around American colleges often bear the name of campus.

CAMPUS ES'QUILI'NUS. A tract of land outside of the Servian agger at Rome, once used as a burial-place for slaves and the lower classes, whose bodies were thrown into common pits. Its unsanitary condition made it a menace to the city, and the cemetery was suppressed under Augustus. Mæcenas covered the whole region with clean earth to the depth of 25 feet, and on the new-made land laid out his famous gardens.

CAMPVERE, kämp-vâr', now called VERE, VEERE, or TER-VERE. A small fortified town of the Netherlands, situated on the eastern coast of the island of Walcheren, in the Province of Zealand, 4 miles northeast of Middelburg (Map: Netherlands, B 3). The town has fallen into decay; but its former prosperity is indicated by the town-hall of white freestone, with an elegant tower, and by the large and beautiful cathedral, which is no longer used. The town has some historical interest. It was the first to proclaim William III., Prince of Orange, General Stadtholder. The town effectually repelled the attack of the Spaniards in 1572.

CAMTOOS (kăm-tōs' *or* kăm-tōōs') **RIVER.** See GAMTOOS.

CAMUCCINI, kä'mōō-chē'nē, VINCENZO (1775-1844). An Italian painter, born in Rome. His first instruction was received from his brother, but afterwards he became a pupil of Corvi. He studied the works of Raphael and Domenichino; but it was the arrival in Rome of the French artist David that stimulated him to the work of painting in a classic manner subjects from Roman history. His "Romulus and Remus" and the "Death of Cæsar" were produced at this time. Among his works extant in Rome are "The Incredulity of Saint Thomas" (in mosaic at Saint Peter's), and "The Conversion of Saint Paul." Camuccini was made a member of the Institute of France, and Francis I., of Austria, bestowed on him the Order of the Iron Crown. As a man of superior taste and considerable fortune, Camuccini devoted himself to collecting pictures and objects of art, and in 1856 seventy of the pictures of his collection were purchased by the Duke of Northumberland. The "Madonna with the Pink," by Raphael, was the most important of them.

CAMUS, kä'mȳ' *or* kä'mȳs', ARMAND GASTON (1740-1804). A French politician, born in Paris. His legal ability and radical zeal brought him into prominence after 1789. He secured and published the so-called 'Red Book,' which contained a damaging record of Court extravagance. He was, as member of the Convention, the most emphatic opponent of all secret orders and ecclesiastical privileges. In 1793, while attempting to capture Dumouriez, who was charged with treason, he was himself captured. After two years and a half, the Austrians exchanged him for the daughter of Louis XVI., and on his arrival in Paris he evoked a great deal of sympathy by recounting the hardships of his confinement. The Council of Five Hundred made him a member by legislative enactment, and subsequently he became president of that body. His best service was performed when, as conservator of the national archives, he preserved from destruction the old documents of the abolished corporations and institutions. He wrote a number of valuable legal works. He died November 2, 1804.

CAM'WOOD (African *kambe,* native name for the tree + Eng. *wood*), or BARWOOD. A dyewood which yields a brilliant but not permanent red color, and is used with sulphate of iron to produce the red color in English bandanna handkerchiefs. It is the wood of *Baphia nitida,* a tree of the order Leguminosæ, a native of Angola. It is preferred to brazilwood, as producing a finer and richer red.

CANAAN, kā'nan (Heb. *Kana'an,* Gk. Χάνααν, *Chanaan,* perhaps from Heb. *kana,* to be low). According to Hebrew tradition, a son of Ham. Gen. x. 6. The curious story is told of him in Gen. ix. 22-27, that he was cursed because of a wrong done not by him, but by Ham to Noah. The latter, becoming drunk with wine, lay uncovered in his tent. Ham saw his father's nakedness, and told his brothers, Shem and Japheth, who covered their father with a garment, walking backward so that they might not see their father in an exposed state. Since it was Canaan who is cursed, and not Ham, it is claimed by many Bible critics that the story was originally told of the former, and the story itself is said to illustrate the opposition to agriculture, of which there are other traces (see article ABEL) in the Old Testament traditions, and also reflects the hostility of the Hebrews to their bitter enemies, the Canaanites. It is also claimed that in an older tradition, woven into the Pentateuch, the three sons of Noah were Shem, Japheth, and Canaan, the first representing the Hebrews, the second a people adjacent to the Hebrews (perhaps the Phœnicians), and Canaan the Canaanites. Subsequently, when the tradition became enlarged to represent all peoples known to Hebrew writers, Ham took the place of Canaan and became the general designation for nations hostile to the Hebrews. (See HAM; JAPHETH.) Canaan, in reality, is merely the eponymous ancestor of the Canaanites, and is also the common designation in the Old Testament for the land to the west of the Jordan, conquered by the Hebrews between the Thirteenth and the Eleventh centuries B.C. It should, however, be stated that the term is used rather indefinitely, and is sometimes made to include territory to the east of the Jordan, since that too was in part settled by the Hebrew clans. To the west of the Jordan the term is extended to include Philistia (e.g. Zeph. ii. 5) and Phœnicia (e.g. Isa. xxiii.), though in general it is limited to the territory actually occupied by Hebrew settlements, that is, the later kingdoms of Judah and Israel.

From the Egyptian inscriptions, in which the name Ka-n-na appears as early as B.C. 1800, it is evident that Canaan was originally applied to the Phœnician coast (including Philistia) and

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from the coast came to be extended to the interior. The etymology of Canaan is not certain, but it is just possible that it designated the 'low' land, since in Egyptian inscriptions the article is attached to the term, and in some Semitic languages the stem *Kana* has the sense of low. There are good reasons for believing that already at a very early period the population of Palestine represented a mixture of races. The oldest known to us are the Amorites, the Anakim, and the Rephaim. These seem to have preceded the Canaanites proper, whom the Hebrews encountered. They were powerful warriors and later tradition represents them as endowed with gigantic strength and of great stature. At the time that the Egyptian rulers began their campaigns for the possession of western Asia (B.C. 1800), the country is already well settled and the existence of numerous towns points to the presence of a civilized population, such as we find at the time of the Hebrew conquest. For several centuries Egypt remained in control, but prior to this period Babylonian influence had been dominant in the country. Whether the country was actually controlled by Babylonian or Assyrian monarchs or not, it is noteworthy that the script and language used by the governors stationed in Palestinian towns in corresponding with Egypt, as is shown by the Amarna cuneiform documents (about B.C. 1400), was the Babylonian. From the letters that passed between Egyptian officials and their royal masters we learn, among other things, that such towns as Jerusalem, Bierut, Byblos, Sidon, Simyre, etc., were already in existence, and there are also indications that in the Fifteenth Century B.C. some of the clans which afterwards were included in the confederacy of the Bene Israel were already in the land, showing, what we know from other sources, that not all of the Hebrew tribes had proceeded to Egypt. In the Fifteenth Century, however, the Egyptian control, as these Amarna tablets show, was beginning to show signs of weakness and the rise of Assyria proved a serious menace to Egyptian supremacy. The internal disturbances in Egypt were another factor which led to the loss of Palestine and Syria, so that when the Hebrew confederacy come into existence about the middle of the Thirteenth Century and the plan was formed to drive the Canaanites out of their possessions, Egypt neither offered any resistance, nor do we hear of their coming to the aid of the Canaanites. The Hebrew conquest was not accomplished at one stroke. It was a gradual displacement of the agricultural population, who were reduced to the grade of dependent serfs where they were not driven out. By the Eleventh Century the conquest may be regarded as complete and for the succeeding three centuries Israel remains in undisputed possession, though threatened at times by Egypt and involved in more or less constant warfare with the Philistines to the west, and with Moab, the Ammonites, and the Edomites to the east and south.

From the Ninth Century the Assyrian rulers pursue a more energetic policy, and as a result, the northern kingdom of Israel falls into their hands (about B.C. 722) together with the Phœnician coast, while the southern portion of Canaan becomes tributary to the great power. A century later the new Babylonian Kingdom accepts the legacy of Assyria, and in 597 Canaan passes into the hands of Nebuchadnezzar II. Persia succeeds Babylonia as a world power and Canaan remains in a position of dependence. Nor is the situation improved with Alexander the Great. The Hebrews, while permitted to exercise certain authority, are under the control of the Greek satraps, and when Greece yields to Rome, Canaan, now known as Palestine from the designation Philistia, given to the southern seacoast, becomes a Roman province. From the beginning of our era to the present time, Canaan has been one of the great battle-fields of the world, one which the conflicts between the Orient and the Occident for supremacy have been waged.

See CANAANITES; CRUSADES; ARABIA; TURKEY; SYRIA; and for the geography, fauna, and flora of Canaan, the article PALESTINE.

BIBLIOGRAPHY. Consult the histories of the Hebrews by Stade, Ewald, Wellhausen, Piepenbring, Guthe, and others; also, G. A. Smith, *Historical Geography of the Holy Land* (New York, 1900).

CANAANITES, kā'*nan*-its. The name given in the Old Testament to the people on the west of the Jordan who were dispossessed by the invasion of the Hebrews. The use of the term is somewhat vague, and in this respect is like the indefiniteness of Canaan as a geographical designation. The Canaanites are commonly enumerated with a group of six other peoples, settled in Palestine prior to the Hebrews—viz., Jebusites, Ammonites, Girgashites, Hivites, Perizzites, and Hittites—to which, in Gen. x. 15, four more are added—Kenites, Kenizites, Kadmonites, and Rephaim—Hivites being omitted; while elsewhere the Girgashites and Hivites are omitted. The grouping is not scientific. The Ammonites represent, apparently, an older settlement than the Canaanites; the Hittites have no connection with Canaanites; while Jebusites and Girgashites are local or territorial designations, forming subdivisions of the Canaanites rather than independent groups; and this may be true, likewise, of the Perizzites. A late tradition (II. Es. i. 21) is probably nearer to the ethnic facts in separating the pre-Israelitish inhabitants of Palestine proper into Canaanites and Perizzites. As to the relationship between the Perizzites and Canaanites we know nothing, though they were probably closely akin. The Canaanites, whose name becomes the general designation for the agricultural population whom the Hebrews found in Palestine, are well known through the accounts which the Hebrew writers furnish. They lived in a state of comparatively advanced culture. As an agricultural people they were rather a peaceful nation, who, however, showed great powers of resistance in opposing the advance of the Hebrews, being better equipped and able to protect themselves in their walled towns. Their religion was precisely of the kind that we would expect among an agricultural people. There was no centralized cult. Each locality had its deity, known as a 'Baal' (i.e. lord), to whom the ground was supposed to belong (see BAAL), and upon whose favor the fertility of the soil depended. Altars were erected to the baals, usually on prominent places or in groves. The pole, representing a tree and symbolizing fertility, stood by the altar, on which the first fruits were piled and conciliatory presents offered in days of distress, or when a failure of the crops was threatened. The festivals were, likewise, of an agricultural character, the three chief festival

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seasons being in the spring, early summer, and autumn. They were occasions of merry-making, and the scenes, particularly of the harvest festival, were of a hilarious character, culminating no doubt at times in riot, and perhaps were somewhat licentious. Many of the religious customs of the Canaanites were taken up by the Hebrews upon their taking possession of the country. The invasion marked the change from a seminomadic to an agricultural life for the latter, and they naturally looked to the baalim for protection and blessings of the soil. This amalgamation of Canaanitish worship with the Jehovistic rites evoked the opposition of the ardent Jehovah worshipers, represented by Elijah and Elisha, in the Ninth Century B.C., and by the Hebrew prophets (Amos, Hosea, Micah, etc.) in the Eighth Century, which led finally to the abolition of the old Canaanitish sanctuaries and the recognition of the temple at Jerusalem as the only legitimate seat of Jehovah worship. The language of the Canaanites, identical practically with the Phœnician (q.v.), was adopted by the Hebrews upon their taking possession of the country. Canaanitish and Hebrew, therefore, as ordinarily understood, are synonymous terms. Among recent anthropologists, Sayce (1888) and Brinton (1890) consider the Canaanites a pre-Semitic white race (Canaanites, Phœnicians, Amorites, etc.) of North African (Libyan) stock, and Sergi (1901) is of similar opinion. Others, looking upon 'Amorites' and 'Canaanites' as somewhat synonymous (as Brinton, in 1895, was inclined to do), ally them with the Semites. Keane (1896) uses Canaanites to designate a group of kindred Semitic peoples, which includes "Hebrews, Phœnicians, Carthaginians, and others." The real Canaanites were probably a people of mixed Semitic and Aryan (possibly, also, Hamitic) blood.

CANA-BOTA, kä'nâ-bō'tâ. A very large shark (*Hexanchus griseus*), inhabiting deep waters off the coast of Europe, and in the Mediterranean, and wandering to the West Indies. See COW-SHARK, and Plate of LAMPREYS AND DOGFISH.

CANACE, kăn'â-sê (Lat., Gk. Κανάκη, *Kanakē*). The offspring of Æolus and Enarete, in Greek mythology, who conceived an incestuous passion for her brother, Macareus, and was punished for it by death. Gower mentions her in the *Confessio Amantis*, and Chaucer in the *Man of Law's Tale*. She is not, however, to be confused with the Canace in the latter author's *Squire's Tale*, who is the daughter of King Cambuscan, and who, owing to the possession of a magic ring, can understand the love plaint of a female hawk.

CAN'ADA (probably from Iroquois *kanada*, cabin), DOMINION OF. A country occupying the whole of the Continent of North America north of the United States, except Alaska (Map: North America, No. 4 Special Maps). The continental portion is about 2700 miles in greatest length, from the Atlantic to the Pacific, and measures about 1600 miles from north to south, which gives to it, with the outlying 'lands' and islands, an area exceeding the United States with Alaska, and nearly equal to that of all Europe; somewhat more than one-sixth of this is under water. Excluding unsurveyed Arctic islands, its gross area approximates 3,500,000 square miles, the land surface of which is distributed among the component political divisions (largely by computation) as follows:

	Square Miles
Prince Edward Island	2,100
Nova Scotia	20,550
New Brunswick	28,150
Quebec	344,450
Ontario	219,650
Manitoba	64,095
Assiniboia	89,540
British Columbia	382,400
Saskatchewan	108,000
Alberta	99,255
Athabasca	239,500
Keewatin	498,000
Yukon	196,300
Mackenzie	481,200
Ungava	276,000
Total	3,048,711

No official statement of area is as yet given for the unorganized territory of Franklin, which comprises the Arctic archipelago. The most northerly point of the domain is probably Cape Columbia, in Grant Land. The most westerly boundary is formed by the 141st meridian of west longitude.

TOPOGRAPHY. The physiography of Canada falls broadly into three great divisions, distinguished by fundamental differences in geological structure, surface, and climate, namely: I. The hilly, diversified eastern half. II. The elevated interior plains, comparatively level, and largely treeless, sloping gently northeast and north. III. The mountain region, between the plains and the Pacific Coast, or the Alaskan region, which consists of the northern extension of the Rocky Mountains of the United States, their included plateaus, and of various coast ranges. Each of these prime features of the continental topography is divisible into certain large, natural subdivisions, which conform in the main to the drainage basins, determined by the events of geological history.

I. The eastern part of Canada has a broken or hilly surface of generally low elevation. The highest points of the coast of Labrador approach 8000 feet, but the interior of northern Quebec and of Labrador, or of the region west of Hudson Bay, does not exceed 1500 to 3000 feet, and slopes steadily to the level of the shores of Hudson Bay. This whole vast region, embracing the land from the lower Saint Lawrence to Hudson Bay, and continuing in a broad margin around it, is a succession of low, often bare or thinly forested ridges of hard rocks, between which are innumerable lakes, swamps ('muskegs'), and torrential rivers. Its recent release from universal glaciation, and the unfavorable climate, have not permitted much valuable soil to accumulate, except in small, isolated areas, and the region is not adapted to any considerable human habitation. Many large rivers flow into Hudson Bay from the east; some shorter, but copious ones, from the south, of which the Moos and Abitibbi form canoe routes to James Bay; while the Albany River forms a canoe route from the Lake of the Woods region to the same inlet. In the west the drainage into Hudson Bay includes the whole basin of the Red, Saskatchewan, Churchill, and other rivers, thus embracing the southern half of the interior plains area; but this will be spoken of later. The Hudson Bay basin is defined south and southeast by a scarcely perceptible watershed, called 'the height of land,' or, along the northern boundary of the Province of Quebec, where

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Beaufort Sea
Melville Sound
Prince Albert Land
Victoria Land
Bathurst Inlet
Great Slave Lake
Great Bear Lake
Reindeer or Caribou Lake
Athabasca
Lake Athabasca
Reindeer Lake
Cedar Lake
Winnipeg
Lake Winnipeg
Lake Manitoba
Great Salt Lake
Salt Lake City
Carson City
Sacramento
San Francisco
Portland
Seattle
Victoria
Vancouver Island
Calgary
Edmonton
Regina
Prince Albert
Yorkton
Brandon
Winnipeg
Helena
Great Falls
Boise City
Deadwood
Pierre
Bismarck
Grand Forks
Cheyenne
Dawson
Ft. Reliance
Fort Selkirk
Fort Yukon
Fort Simpson
Fort Resolution
Fort Chipewyan
Fort Smith
Fort Nelson
Fort Liard
Fort Norman
Fort Providence
Fort Rae
Fort Chipewyan
Fort Simpson
Fort Nelson
Fort Liard
Fort Norman
Fort Resolution
Fort Rae
Fort Providence
Fort Smith

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it is better defined the 'Laurentian Hills,' which divides the heads of the streams flowing northward from those draining southward into the Saint Lawrence. This very ancient river valley, which includes the whole system of the Great Lakes (partly within the United States), is over 2000 miles long, and forms the drainage outlet for an area of about 500,000 square miles. The surface of the Saint Lawrence Valley is broken in places by intrusive igneous rocks, which remain standing above the surface in such abrupt heights as Mount Royal, at Montreal, and the picturesque *buttes* south of that city. Another topographic feature in this region is the Niagara Escarpment, the eastern edge of a plateau over the brink of which the waters of Lake Erie are poured into Niagara Falls (q.v.). As the escarpment is traced northward, it becomes more lofty, rising into high, rocky hills, which form the backbone of the triangular, very picturesque extension of land separating Lake Huron from Georgian Bay. The valley of the Saint Lawrence narrows toward its mouth, where the northeastern extension of the Appalachians forms the mountainous Gaspé Peninsula and also the islands of Anticosti and Newfoundland. South of this lies the distinct region of the Maritime Provinces, whose features are largely similar to those of New England. See NEW BRUNSWICK; NOVA SCOTIA; PRINCE EDWARD ISLAND.

II. The second great division of Canada—the Interior Plains—comprises the area, some 700 miles in breadth, which continues the plains of the United States northward to the shores of the Arctic Sea, between Hudson Bay and the Rocky Mountains. This region is, however, more broken, well watered, and has more forest than the high, open plateaus southward, and is lower, constantly diminishing in altitude northward, the international boundary (latitude 49° N.) nearly coinciding with the watershed between the drainage into the Gulf of Mexico and that into Hudson Bay. Referring to this Canadian plains region, Sir George M. Dawson, chief of the Geological Survey of Canada, wrote:

"The whole interior region of the continent slopes gradually eastward from the elevated plains lying near the base of the Rocky Mountains to the foot of the Laurentian Highlands, and, though the inclination is more abrupt in approaching the mountains, it is not so much so as to attract special attention. Between the fifty-fourth and forty-ninth degrees of latitude, however, along the lines which are in a general way parallel and hold a northwest and southeast course across the plains, very remarkable step-like rises occur. These escarpments form the eastern boundaries of the two higher prairie plateaus, and the most eastern of them overlooks the lowest prairie level, or that of the Red River Valley. The three prairie steppes thus outlined differ much in age and character, and have been impressed on the soft formations of the plains by the action of subaërial denudation of former great lakes and probably also of the sea. . . . The actual increase of elevation accounted for in the two escarpments, however, is slight compared with that due to the uniform eastward slope of the plains. The direction of greatest inclination is toward the northeast, and a line drawn from the intersection of the forty-ninth parallel and the mountains to a point on the first prairie level north of Lake Winnipeg will be found to cross the escarpments nearly at right angles, and to have an average slope of 5.38 feet to the mile. From the same initial point, in a due east line to the lowest part of the valley of the Red River, a distance of 750 miles, the plains have an average slope of 4.48 feet per mile. . . . Northwest of the North Saskatchewan no extensive treeless plains occur in the central region of the continent, and the forest country of the east forms a wide, unbroken connection with that of the northern portion of British Columbia."

Along the edge of the lowest or easternmost of these levels lies that series of great lakes—Manitoba, Winnipeg, Winnipegosis, Reindeer, La Hache, and many other lesser ones—which form so striking a feature on the map, and empty by large, rapid rivers into Hudson Bay. Down from lakes on the second level flow such large rivers as the English or Churchill, Ice and Dobaunt, the Ice carrying to Hudson Bay some overflow from Lake Athabasca; while from the foot of the Rocky Mountains, and gathering the drainage of all three plains levels, comes the great Saskatchewan, in two branches, the North and the South, to enter Lake Winnipeg (which also receives from the south the large Red-Assiniboine affluent), and thence to flow through Nelson River to Hudson Bay. North of the North Saskatchewan, on about the 55th parallel of north latitude, a line of rocky and forested highlands forms a watershed between its valley and that of the outflow toward the north. This begins with the great Athabasca and Peace rivers, which pass eastward from the base of the Rockies through a rough region to Athabasca Lake, and thence enlarged (as the Slave River) to Great Slave Lake, which also receives the powerful Liard from the west. This lake narrows westwardly into the Mackenzie, which flows northwestward to the Arctic Ocean, about 120 miles east of the border of Alaska. This great river is the equal of the Missouri in length, but discharges more water than does that stream, and is comparable to the mighty watercourses of Siberia. Its course lies near the base of the Rocky Mountains, west of which lie the head streams of the Yukon (q.v.), all of which are within Canadian territory. East of the Mackenzie, half way between Great Slave Lake and the Arctic Coast, lies the extensive Great Bear Lake, a feeder for the Mackenzie. Here the country is low, and a part of this lake's waters escapes into Coronation Bay by way of the Coppermine River. East of the head of the Coppermine a low divide turns the waters east of it into the Great Fish or Back River, which flows through the desolate wastes, called the Barren Grounds, that lie between Hudson Bay and the Arctic Ocean (Victoria Strait), and empties into the latter at Elliot Bay. Of all these rivers, the greatest is the Mackenzie, but the most important are the Saskatchewan and the Red, for they have made available a wide area of habitable and valuable land. The Saskatchewan collects most of the waters of the three districts, Alberta, Assiniboine, and Saskatchewan, by the two main channels, each some 300 miles in length, and then flows 200 miles more to Lake Winnipeg. This lake also receives, besides the Red River and its tributary, the Assiniboine (which drain all southern Manitoba and much of North Dakota and

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Minnesota), the Winnipeg River, and the lakes Manitoba, Dauphin, and Winnipegosis, which, together, equal or exceed the bulk of Lake Erie. Lake Winnipeg itself is nearly as spacious as Lake Huron, and pours its waters through the great Nelson River, a series of rapids descending to Hudson Bay. The Saskatchewan and Red rivers were the former avenues of travel, and their valleys are now the seat of the principal population and industry in the Northwest.

III. The mountainous western border of Canada consists of a belt of snowy ranges from 500 to 600 miles in width. On the east are the Rocky Mountains, continuous with those of Montana, which consist of gigantic uplifts and foldings of the strata. Hence the scenery presents series of vast bedded cliffs, and weather-worn, jagged summits, instead of the rounded domes and slopes familiar in the southern Rockies. The ranges run northwest in approximately parallel lines, which are capped with snow and glaciers. This is due to their high latitude rather than to altitude, since there are but few peaks that exceed 11,000 feet, except between latitudes 52° and 53°, where a number of peaks have recently been described whose elevations appear to exceed 13,000 and 14,000 feet. Mounts Columbia, Forbes, Bryce, Alberta, and Freshfield are seemingly the highest of these. A somewhat distinctive range west of the first is the Selkirk, in which are the headwaters of the Columbia River, and which carries the Great or Illecilleweat glacier. Then comes the Gold or Columbia Range, while farther west lies a broad, elevated plateau valley, drained by the Thompson and Fraser rivers, and forming the centre of British Columbia. Between this valley and the Pacific Coast extends a belt of intricate coast ranges, which northward form the boundary mountains between Canada and Alaska, and whose outermost summits constitute the line of islands—Vancouver, Queen Charlotte, and the Alexander Archipelago — which characterize that coast. (See BRITISH COLUMBIA and ALASKA.) It is through these coast ranges that the Fraser River (about equal to the Ohio) cuts its way in a series of magnificent cañons. These orographic features have had a very important bearing on both the climate and the economic value of this part of the country.

CLIMATE AND SOIL. The difficulty which meets one at the outset who attempts a brief generalization of Canada in any of its broader aspects is well stated by one of the latest essayists in this direction. "To characterize in a few lines," he remarks, "a country covering more than half the continent of North America, and reaching from the latitude of Constantinople to the North Pole; a country whose circuitous coast line on the Atlantic measures 10,000 miles, and whose western shore upon the Pacific, studded with islands and indented by secure harbors and deep inlets, attains almost an equal length; a country where maize and peaches are staple crops, and where vegetation fades out upon the desolate and melancholy shores of the Arctic Ocean—to characterize such a country by a few general phrases is evidently impossible. If we look at the eastern portion alone, we see the greatest forest region in the world. If we consider the central portion, we are regarding the great prairie country; but if we cross the passes into the Pacific Province, we enter upon that 'sea of mountains' compared with which the most mountainous country in Europe is of limited extent." In the northeastern region, the 'Hudson Bay Country,' the characteristics are Arctic or sub-Arctic—a brief, warm summer and a long, cold winter, with much fog at all seasons on the ice-bound coast. The current of cold water flowing down that coast past Greenland keeps the entrance to Hudson Bay frozen nearly two-thirds of the year, and often packs ice along the coast of Labrador so persistently as to make it inaccessible until midsummer; while the region of the Gulf of Newfoundland abounds in fog, and the air of New Brunswick and Nova Scotia is surprisingly cool, with much rain and snow. In the northern interior dry and severe cold prevails over half of the year, the mercury, even as far south as Manitoba, frequently dropping to 50 degrees below zero of the Fahrenheit scale. The climate of the Saint Lawrence Valley, however, is excellent—cold, dry, and bracing, with much snow and occasional severe cold in winter, and in summer heat without much moisture, but usually an abundance of rain for crops, which are also nourished by the moisture given to the ground by the plentiful snow. In the Maritime Provinces the neighborhood of the ocean modifies the extremes both of winter cold and summer heat, but causes more rain and fog. As for soil, north of the Laurentian Hills, and through the Hudson Bay and Labrador regions, it is scanty, and little except garden vegetables can be grown, because of the liability to summer frosts. In the valley of the Saint Lawrence, however, a belt of alluvial lowland near the river is extremely fertile; and the whole of southern Ontario, by reason of its moderate climate and varied soils, largely the result of glacial deposits, is exceedingly well adapted to agriculture in all its phases, and to the raising of all the hardier fruits. The grain crops and apples of Ontario are famous. There is little space among the rocky hills of northern Ontario for agriculture, and the winters are rather too severe north and west of Lake Superior; but when the plains of Manitoba are reached, highly favorable conditions for agriculture are again encountered. The soil of the Red River Valley, including the valleys of the Assiniboine and Souris (Mouse), is a deep black prairie loam of the highest fertility. The same may be said of the whole plains region, even on the high western steppes, where only water is needed to insure great productivity, and of all the valleys of British Columbia and its coast.

The climate of the more southerly, habitable part of the Canadian Northwest is much more favorable to life than one would suppose from a knowledge of its latitude merely. The isotherm of 65° F. mean summer heat, which is that of the St. Lawrence Valley at Quebec, curves northward along the south shore of Lake Superior and through Manitoba and Assiniboia to northern Alberta. This increase of warmth westward and northward, as the mountains are approached, is due to the effect of the mountains upon the prevailing air-currents. There, as elsewhere, the usual winds blow from the west, and come to the coast expanded and saturated with warmth and moisture, after flowing for thousands of miles across the Pacific, whose waters are twenty degrees warmer than are those of the North Atlantic. Vancouver Island and the coast of British Columbia have a climate, in consequence, much like that of the south of England,

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but warmer, and even more moist. Flowers bloom in the gardens the year round, and fruit reaches the utmost excellence. Warmth and rainfall are derived from the latent heat, and absorb moisture set free by condensation of the oceanic air against the high and cold Coast Range. Robbed of only a portion of their burden, but lifted and rarefied by elevation, the winds sweep across the interior valley of British Columbia and strike against the snowy Rockies, to deposit more rain or snow, but rain so rarely falls on the intervening Fraser-Thompson Valley that agriculture there must depend upon irrigation. The reason for this is that the ever-ascending heat of the sun-baked plains buoys up the higher air-currents and lifts them straight across to the Selkirks and Eastern Rockies, to whose vast snow-fields they give almost all of the moisture yet remaining. These once warm winds are now, however, cool winds, because they have become dry and rarefied. The eastern side of the Canadian Rocky Mountains has little snow, and is sparsely provided with trees, as compared with its western side, or with the coast ranges, and the general temperature is cooler; yet the eastern foothills of the Rockies have a milder climate and earlier spring than the western, or than is enjoyed by Manitoba. This is due to the phenomenon called the Chinook, which is a wind caused by the rarefied air rushing down from the summits, necessarily increasing in density by compression as it strikes the plains level, absorbing moisture and giving up its latent heat to the extent of about 23° F. The chinook is not a wind that has come warm from the Pacific, but is of local origin. In summer the same breeze seems cool in comparison with the fierce radiation of the baked plains, but it is equally a chinook. (See CHINOOK WIND.) The genial influence of this warm, dry wind is seen in winter in the quick evaporation of the snow, and the consequent exposure of pasturage to stock, and in producing early conditions of spring. On Peace River the winters are milder than those of Manitoba or Ontario, and everything that will grow near Toronto will ripen at Dunregan, 13 degrees of latitude north of it—the same latitude as the middle of Labrador! Its influence wanes with distance eastward, however, and Manitoba is subject to the extremes of its position at a high latitude in the centre of a continent, being subject to excessive noonday heats in summer and excessive cold in winter, with the nights always cool, and the autumnal frosts liable to begin in August. In the extreme north a rigorous Arctic climate prevails, with the winter temperature descending to —75°. The summers are, however, still favorable to plant growth. The whole Northwest, however, is healthful in a high degree.

FLORA. The flora of all the northern part of Canada is Arctic and sub-Arctic, and this characterizes the scanty growth in the eastern part all the way down to the height of land which separates Labrador and the basin of Hudson Bay from the Saint Lawrence Valley. A great space between Hudson Bay and the Arctic shores is almost a desert, and has been known from the earliest times as the Barren Ground or Tundra, yielding hardly anything more than mosses, lichens, and a few willows and hardy herbs. The flora of the Saint Lawrence Valley and of the Maritime Provinces differs little from that of the northeastern United States, the whole of that space having been originally covered with mixed forests of large and valuable trees, both coniferous and hard wood. The western plains are comparatively treeless as far north as the Saskatchewan, yet are covered with prairie grasses and herbage, which thin out toward the higher and drier steppes westward, where the plains are covered with the bunch-grasses which once supported enormous herds of buffaloes and antelopes, and now furnish sustenance for a rich stock-raising region. North of the Saskatchewan a broad belt of rather small and sparse trees extends from Hudson Bay to Great Slave Lake and the Rocky Mountains—chiefly spruce, tamarack, and poplar. The dry western slopes and valleys of the Rocky Mountains are thinly covered with woods, mainly pine; but the forest increases in density and the trees in size as one proceeds west toward the region of greater rainfall; and after passing the treeless Fraser-Thompson Valley, the coast ranges, and especially their western slopes, are found covered with the dense forests of mighty evergreen trees that characterize the northwest coast of all North America. The principal trees are the Douglas spruce, or 'Oregon pine' (*Pseudotsuga*); the white cedar (*Thuja*); a hemlock (*Tsuga Mertensia*), and Engleman's spruce (*Picea Englemanni*). These coast forests are inconceivably dense and sombre, and their average height on the lowlands is not less than 200 feet, while the Douglas spruces often exceed 300 feet, and the cedars are hardly less tall.

FAUNA. The animals of Canada are as varied as its flora and characteristic of northern latitudes. All bear a close resemblance to those of Northern Europe and Asia, and many species are identical—that is, have a circumpolar range. (See AMERICA, paragraph on *Fauna*.) The carnivora are represented by several species of the weasel family (such as the ermine, sable, fisher, wolverine, mink (qq.v.), etc., whose abundance and value long ago gave the name Fur Countries to northern Canada. There are also the lynx, bear, fox, wolf, skunk, and in the Northwest the badger. The puma or American lion is still found in some parts. Among the rodents, the beaver is so widespread and characteristic, and was so important to the beginnings of colonial civilization, that it has become the national emblem of the Dominion. The Canadian porcupine, muskrat (locally called 'musquash'), hares, and many smaller rodents are numerous, and on the western plains are a variety of burrowing 'gophers' and the like. The Virginian and black-tailed deer enter the southern edge of Canada, and the elk is found in the Rocky Mountains, but the moose and various caribou range all over British North America; and in the mountains of British Columbia the wild sheep and the white goat antelope are numerous and highly characteristic. The prong-horn antelope is still abundant in some parts of the Saskatchewan Valley, and the musk-ox is found in the Arctic tracts. There is an immense variety of birds, many of which, characteristic of northern climates, are unknown southward; but the majority are migrants that go to the northern parts of Canada to breed, and leave the country in the winter for warmer regions southward. Fishes are numerous in all the inland waters, and about all the coasts (see Fisheries, below), but reptiles and the

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months, and it is generally adequate for the needs of the crops. The driest portion of the plain is on the western border, but much of this is irrigable and even in its natural state is well adapted to grazing. The Government exercises a close supervision over irrigation, and there are 525 miles of ditches and canals. From the Great Lakes eastward to the Atlantic the agricultural area is limited only by surface conditions, the climate being very favorable. There is in this area much hilly and broken territory which does not lend itself readily to profitable cultivation. But throughout northern Canada, including the greater portion of the Laurentian region, the climatic conditions will never admit of agricultural development. See *Climate*.

The districts in which agriculture has developed most are Prince Edward Island, the protected valleys of the Annapolis in Nova Scotia and the Saint John in New Brunswick, the narrow valley of the Saint Lawrence above Quebec City, peninsular Ontario, and the Red River Valley in Manitoba.

Ontario far exceeds any other province in agricultural importance—indeed, it is equal to all the others combined. Especially remarkable is the extensive cultivation of oats, the acreage being about 2,400,000. In barley and peas, particularly the latter, it also greatly outranks the other provinces, each crop having considerably over 500,000 acres devoted to its cultivation. Its acreage (1,400,000) and yield of wheat is almost as great as that of the more famous fields of Manitoba, and it is practically the only province of the Dominion in which corn is raised. Much attention is given to the raising of hay in Ontario and all the eastern provinces, large quantities of which formerly used to be shipped into the United States, particularly from the eastern townships of Quebec.

The Maritime Provinces, excepting Prince Edward Island, have never entered so extensively into agricultural pursuits, but have become well known for the production of certain crops. Potatoes and turnips receive great attention, and the yield and quality of the product are remarkable. The same is true of the apple crop of the Annapolis Valley in Nova Scotia, and, to a less degree, of the Saint John's Valley, New Brunswick. The annual shipments of apples from these provinces together with those from Ontario and Quebec are enormous. The Lake Erie coast of Ontario has become noted for its grapes. It has been found that larger fruits do not thrive well on the western plains, but throughout the whole of southern Canada and well to the northward, various kinds of smaller fruits, particularly berries, thrive abundantly. British Columbia, though not possessed of such large tracts of arable land as the other provinces, can still boast of its greater adaptability for fruit-raising, and the production of hops is being extensively engaged in.

On many farms throughout agricultural Canada, particularly in Manitoba, wheat formerly constituted almost the only crop, but more recently there has been a growing tendency toward mixed farming and the raising of cattle and other stock. Canadian stock has a wide reputation for the purity of its breeds, and great care is taken to prevent deterioration. The raising of beef for the English market has long been an important source of revenue. Probably no phase of agricultural development in the East is so remarkable, however, as the dairy industry. In Ontario alone the creameries increased from 74 in 1893, to 323 in 1899, and during the same period the cheese factories increased from 897 to 1203. In all the eastern provinces poultry-raising is attended to, and the exportation of eggs is very large. In the absence of other recent statistics covering the whole of Canada, the export figures are the fairest available test of agricultural development. The total exports of the domestic agricultural products increased from $19,341,000 in 1868, to $81,000,000 in 1900. Wheat and flour had not increased very materially until the last three years of that period, when it averaged over $18,000,000, considerably more than twice the average for former years. Oats has averaged a little less than $3,000,000 for the last three years mentioned, which is also over twice the average for former years. Barley, on the contrary, shows a decided falling off, while peas continue to fluctuate about $2,000,000. Butter, while showing great fluctuations, reached its high-water mark in 1900, when it exceeded a value of $5,000,000. Cheese, however, shows a constant increase, having been $548,000 in value in 1868, $9,000,000 in 1890, and $19,000,000 in 1900. Cattle shipments increased rapidly until 1891 and more slowly since that period, the value amounting to $9,000,000 in 1900. The exports of sheep for two decades have fluctuated at about $1,500,000 in value. The exportation of horses, whose value averaged about $2,000,000 for the decade ending with 1890, averaged about $500,000 less for the succeeding decade, but subsequently increased, due to the demand for the war in South Africa.

The Dominion Government has established a central experimental farm at Ottawa, and four branch farms in more remote parts of the Dominion. The several provinces have encouraged agriculture by grants to societies and fairs, bonuses to creameries and cheese factories, and in various other ways.

MANUFACTURES. The great abundance of natural resources in Canada, including raw manufacturing material, affords a good basis for the upbuilding of the manufacturing industry. Additional advantages come from the abundance of fuel, particularly in Nova Scotia, where coal is plentiful, and from the widespread facilities for procuring water and electrical power afforded by the numerous rapids and falls characteristic of Canadian rivers. The thriving condition of Canadian industry is indicated by its trade statistics, which show that the value of the exports of manufactured articles, exclusive of lumber products, increased from $5,741,000 in 1890, to $14,224,000 in 1900. Of the resources upon which Canadian manufactures depend, the most important are her forests. (See LUMBER INDUSTRY.) In former days these furnished the material for extensive shipbuilding, but with the decreased use of wooden vessels this has become unimportant. There has, however, been a continuous growth in the manufacture of furniture, doors, sashes, and other wooden articles. As indicated by the export figures, the value of manufactures of wood was augmented from $870,000 in 1890 to $3,127,000 in 1900. The greatest increase was contributed by wood-pulp, the value of whose exports increased from $168,000 in 1890 to $1,816,000 in 1900. This is the product of the

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spruce forests, for which paper-making insures a lasting and growing demand. The abundance of hemlock is also of great importance, in view of the growing demand for it in the tanning trade. Leather is another article of growing importance. Boot and shoe manufacturing is carried on at Montreal and Quebec, a large part of the labor being done by French Canadian girls. Cottons are manufactured in Quebec and woolens in Ontario. The manufacture of iron and steel products is another rapidly developing branch of industry, most promising in Nova Scotia, because iron ore, coal, and limestone are there found in close proximity. The value of the exports increased from $294,000 in 1890 to $1,535,000 in 1900. At Winnipeg, Toronto, and a few other points, pork-packing is carried on.

LUMBER INDUSTRY. From an early day the forests of Canada have been one of her main sources of wealth and the making of lumber has been a leading factor in the industrial life of the people. In the eastern provinces the trees have been cut from large sections of the country, including almost the whole of Ontario south of the Canadian Pacific Railroad. Formerly little attention was given to judicious cutting, and the approach of the lumberman meant the destruction of the forest. Present laws furnish partial protection. Worse than the onslaughts of the lumbermen has been the destruction by fires, but an effort is now being made to guard against that also; nevertheless, some of the most valuable varieties of forest trees—notably the white pine—stand in danger of extermination. Owing to the very limited market in the West, the fine forests of Douglas fir and other useful trees are but little worked. The great forests of the country are Government property, and a large revenue is obtained therefrom. (See *Finance.*) The lumberman must first buy at auction a license to cut, after which he pays an annual rent on the ground and a royalty on the timber cut. Winter is the cutting season, when the snow affords means of transporting the logs to the streams, and the amount of the winter's yield is therefore dependent upon the duration of the snow. In former years the export of timber to English markets was generally in the log, but more recently mills have been established, and the logs are sawed before shipment. The exports of forest products increased from $26,000,000 in 1890 to $29,663,000 in 1900, the United States and Great Britain taking about equal quantities. Most of the product from the Great Lake region goes to the United States, while that from the Saint Lawrence and Maritime Provinces goes to Europe. White pine and spruce are the most important varieties.

TRANSPORTATION AND COMMUNICATION. Canada owes its commercial development in a great measure to its facilities for navigation, particularly on the Saint Lawrence River and Great Lakes. These great natural waterways have been further improved by the Government by means of a thorough-going canal system, so that vessels drawing 14 feet of water can now pass from Lake Superior to the Atlantic. It has been the ambition of the Canadians to make it possible for ocean steamers to pass directly to and from the lakes, but it has seemed impracticable so far to carry it out, and Montreal will probably continue to be the head of ocean navigation. The Saint Lawrence canals, which are nine in number, have a total length of 73⅜ miles, while those connected with the Ottawa and Rideau rivers have a total of 29¼ miles in length. A magnificent ship canal also connects Lake Superior with Lake Huron along the east bank of the Saint Mary's River. The total cost of constructing and maintaining all Canadian canals has been $95,316,000 (1900). Of other waterways, the Saskatchewan of the Western plains is destined to be of great importance as a means of transportation. It was in early days a canoe route to the Rocky Mountains, and now has steamboats running for long stretches on the North Saskatchewan. Steamboats also run for a long distance on the Red River. The Hudson Bay Company keeps a line of steamers operating upon the Mackenzie River for the benefit of its posts, and during the brief summer they pass back and forth between the mouth of the Athabasca and the mouth of the Mackenzie. There are also steamboats on the upper Fraser and Thompson rivers. Finally, the recent peopling of the Yukon district has caused a frequent steam service to be operated on that river and its larger headwaters, enabling passengers to go to any of the towns along the river by steamboat from the terminus of the White Pass Railroad, at White Horse Rapids, to its mouth. See ALASKA; YUKON GOLD-FIELDS.

The same zeal which has characterized Canada in the utilization of her waterways has led her to still greater efforts for the creation of an adequate railway system. It was realized that intercolonial and transcontinental railways were a necessity, not only for the opening up of the West and the commercial development of the whole country, but more particularly as a political measure, inasmuch as the railways would serve as a bond of union between the provinces, and indeed the assurance of such a road was a prerequisite of some of the provinces before they would enter into the present confederation. Thus it was that, among others, two of the principal lines—the Intercolonial and Canadian Pacific—were undertaken through Government initiative, and the former was completed and is still held by the Government. The latter, however, as is true of most other lines, was turned over to private hands, the Government conferring upon the company a grant of land and a cash subsidy, and the line thus provided for was successfully completed in 1887. With the development of the country the railroads are able to rely more and more on their own resources, although they still seem to be far from a position of entire financial independence of the Government. Aid to the railroads has been given by the provincial and municipal governments, as well as by the Dominion. Of the billion dollars of capital invested in the roads, 16 per cent. represents Dominion grants, 3.18 per cent. provincial grants, and 1.59 municipal grants. In 1900 it was estimated that 1217 passengers and 2036 tons of freight were carried to every mile of line open; the length of track amounted to 17,824 miles, 6800 of this being in Ontario. The Grand Trunk line and the other two lines above mentioned control about two-thirds of the total. Canadian lines connect with those of the United States by bridges across the Saint Lawrence, Niagara, and Saint Mary's rivers, by tunnels under Detroit

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River, and at several points on the Southwestern frontier.

COMMERCE. The foreign trade of Canada shows a remarkable growth. The exports of domestic produce increased from $85,200,000 in 1890 to $170,600,000 in 1900. The largest item ($56,000,000) and the greatest absolute advance was in animals and animal products. Second in absolute and first in relative increase were the mine products. The export of agricultural and manufactured products each more than doubled during the period, but the increase of forest and fish exports was not so great. (See sections in this article on these different industries.) Great Britain and the United States receive most of the exports, the proportion going to Great Britain having increased during the period from 46 to 65 per cent. due to the great increase of agricultural and animal exports, most of which goes to that country. The mine products constitute the only export which goes almost exclusively to the United States. The exports of foreign products in 1900 amounted to $21,200,000. The imports for home consumption have similarly increased, being $180,800,000 in 1900, against $112,800,000 in 1890. Great Britain and most of her possessions enjoy preferential tariff rates admitting goods on a tariff rate 33⅓ per cent. less than the duty levied on goods from foreign countries.

The Canadian trade of the United States is next in importance only to that with Great Britain, Germany, and France. The exports from the United States to British North America are nearly three times as large as the imports. The following table shows the course of trade during the last decade of the century:

YEAR	Imports into British North America from the United States	Exports from British North America into the United States
1891	$39,000,000	$39,000,000
1892	45,000,000	35,000,000
1893	49,000,000	38,000,000
1894	58,000,000	31,000,000
1895	54,000,000	37,000,000
1896	61,000,000	41,000,000
1897	66,000,000	41,000,000
1898	85,000,000	32,000,000
1899	90,000,000	32,000,000
1900	97,000,000	40,000,000

It will be observed that while the exports from Canada to the United States remained stationary during the decade those from the United States to Canada increased nearly 150 per cent.

BANKS. Every bank, in making payments, can be compelled to pay out a certain proportion of Government notes, and must hold of its cash reserve at least 40 per cent. in Government notes. In 1900 the various banks and their branches had a total capital of $65,000,000, with $46,500,000 in circulation, $305,000,000 on deposit, $356,40,000 in liabilities, and $459,700,000 assets. Post-office savings banks have been in operation since 1867; in 1900 the depositors numbered 150,900, and the average deposit amounted to $248. There are also Government savings banks in Ontario, Nova Scotia, New Brunswick, Manitoba, British Columbia, and Prince Edward Island.

GOVERNMENT. By the terms of the British North America Act of 1867, the provinces of Ontario and Quebec, known also as Upper and Lower Canada, joined with the Maritime Provinces of Nova Scotia and New Brunswick to form a Federal Government under the name of the Dominion of Canada. Since that time the original number of provinces has been increased to seven by the admission of Manitoba, British Columbia, and Prince Edward Island, and the public territory of the Dominion has been augmented by the purchase of the Northwest Territories from the Hudson Bay Company; but the Constitution drafted in 1864 and embodied in the act of 1867 is still in force. Based upon the general principle of the definite division of powers between provincial and central governments, the Canadian Constitution differs from that of the United States in the fact that all powers not explicitly assigned to the provinces are reserved to the central Government. Under the exclusive jurisdiction of the Federal Legislature are the administration of the public debt and property, the imposition of taxes for general purposes, the organization of the public defense, including the militia; the subjects of banking, paper money, promissory notes, legal tender, currency, and coinage; the regulation of commerce, navigation, and shipping; the coast service, the postal service, census, statistics, patents, and copyright; naturalization, aliens, and Indians; marriage and divorce. The subjects within the scope of the provincial legislatures are, among others, those of taxation for local purposes, the regulation of local commerce, the erection of municipal corporations, the borrowing of money on the credit of the province. On the questions of agriculture and immigration, the Federal and the provincial legislatures possess concurrent jurisdiction; but it is provided that in the contingency of a conflict of legislation, the law of the Dominion shall prevail. Although the powers of government have, in this manner, been definitely portioned out, there has been no lack of intrusion on the part of either party into the sphere of the other. On such occasions, when compromise has been found impossible, the principle of the superior authority inherent in the central Government has been adhered to. Striking examples of this predominance are the right given the Governor-General to disallow within a year any law enacted by the provincial legislatures and the power of appointing the Lieutenant-Governors of the provinces.

The lawmaking power of the Federal Government is vested in the King of Great Britain or his representative and the Dominion Parliament. The Parliament, the seat of which is at Ottawa, is composed of an Upper House or Senate and a Lower House or House of Commons. The members of the Senate, who are appointed for life by the Governor-General, must be subjects of the King, 30 years of age, residing in the province whence they are summoned, and owning property there to the value of $4000. At present there are 81 Senators, of whom 24 are from Ontario, 24 from Quebec, 10 from New Brunswick, 10 from Nova Scotia, 4 from Prince Edward Island, 4 from Manitoba, 3 from British Columbia, and 2 from the Territories. The House of Commons is elected practically by manhood suffrage for a period of five years, on the basis of population. Officers of the civil service and Government contractors may not sit in Parliament. It is provided that Quebec shall always have 65

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representatives in the Commons, and the other provinces a number bearing the same ratio to their population as 65 bears to the population of Quebec. On the basis of the census of 1901 the representation in Parliament comprised 92 members for Ontario, 65 for Quebec, 18 for Nova Scotia, 13 for New Brunswick, 10 for Manitoba, 8 for British Columbia, 4 for Prince Edward Island, and 6 for the Territories.

The executive power is vested in the King or his representative (the Governor-General) and a Privy Council composed of a premier, thirteen heads of departments, and two ministers not of the Cabinet. The governmental departments are those of State, Trade and Commerce, Justice, Marine and Fisheries, Railways and Canals, Militia and Defense, Finance, Posts, Agriculture, Public Works, Interior, Customs and Internal Revenue. The principles regulating the relations of the executive to the legislature, and of the two branches of the legislature to each other, are the same as those that underlie the parliamentary scheme of government in Great Britain. The Governor-General is practically guided by his ministers, who in turn are responsible to the House of Commons; and though the executive may reserve a law for the consideration of the home Government, or disallow it altogether, the latter right is in practice never exerted, and the former is employed only when a measure concerns the interests of the Empire at large and tends to affect the relation of the Imperial Government to foreign powers. Within Parliament the predominant power is wielded by the popular chamber. Not only must money bills originate in the Commons, but the Senate may not even amend a bill from the Lower House; its power of rejection is seldom employed, and though it possesses the right of initiative in many matters, its share in originating legislation is quite inconsiderable.

Of the provincial governments and of the differentiation between their scope of authority and that of the State, it may be said that in general they are endowed with the full power of control over local affairs, subject only to the consideration of the general welfare of the Empire. A detailed description of provincial governments will be found under the names of the several provinces.

The judicial branch of the Federal Government consists of a Supreme Court at Ottawa, with appellate civil and criminal jurisdiction throughout the Dominion, and an Exchequer Court with powers of admiralty. There are no inferior Federal courts, but the central government avails itself of the judicial machinery in each of the provinces, which comprises a superior court, county courts, police magistrates, and justices of the peace. To be precise, however, the superior and county courts are not exclusively State tribunals, in that their judges are appointed by the Governor-General of the Dominion. The penitentiaries, too, are under the care of the Federal Government.

Army.—The King is the commander-in-chief of the naval and military forces, but the control of them is in the hands of the Dominion Parliament. Except a garrison of 2000 British troops at Halifax there is no regular army in Canada; the defense of the Dominion is intrusted to the militia, which comprises all British subjects between the ages of 18 and 60, and is divided into an active force serving for three years and a reserve force, which includes all non-active citizens liable to service. The active militia is raised by voluntary enlistment or by draft, and is limited by law to 40,000 men. On June 30, 1901, the effective force numbered 38,090 officers and men. The Dominion takes no share in the naval defense of the country, which is left entirely to the Imperial Government.

FINANCES. The central Government controls the collection of the customs revenue, and over half the receipts come from this source. Free trade exists between the provinces. The customs revenue increased from $23,900,000 in 1890 to $28,800,000 in 1900; the internal revenue during the same period increased from $7,600,000 to $9,800,000, and the revenue from other sources increased from $8,293,000 to $13,800,000. The provinces surrendered to the central Government the power of collecting the customs revenue only on condition that they should receive in return annual subsidies. In 1890 the subsidies aggregated $4,100,000, in 1900 $4,250,000. Of the other principal items of expenditure, the charges on the public debt increased during the decade from $9,656,000 to $13,400,000; railways and canals remained about constant, viz. $5,311,000 and $5,400,000, while the public works charges decreased from $4,892,000 to $2,400,000. The total expenses for 1900 were $44,000,000. The per capita receipts were $9.50; the per capita expenditure $8. The net debt of the Dominion is $265,000,000.

POPULATION. In 1703 the French population amounted to about 65,000, confined to the immediate vicinity of the lower Saint Lawrence and its tributaries; in 1791 Upper Canada had 50,000 inhabitants and Lower Canada 130,000. In 1860 the total population, exclusive of Indians in the Northwest and Hudson Bay Territories, was 3,906,810—2,110,502 born in Great Britain and Ireland and 1,082,940 French; in 1871, 3,635,024; in 1881, 4,324,810; in 1891, 4,833,239; in 1901, 5,338,883. The following table shows the distribution by provinces and the changes during the last decade:

PROVINCES	1891	1901
British Columbia	98,000	190,000
Manitoba	152,000	246,000
New Brunswick	321,000	331,000
Nova Scotia	450,000	459,000
Ontario	2,014,000	2,167,000
Prince Edward Island	109,000	103,000
Quebec	1,488,000	1,620,000
Territories { Alberta, Assiniboia, Saskatchewan }	66,000	145,000
Unorganized Territories	32,000	75,000

It will thus be seen that the Canadian population increases but slowly, the growth for the last decade being less than 10 per cent., not so great as would result from the natural increase by birth, the birth-rate being high, as indicated by the average size (5.1 +) of families. The most marked growth has taken place in the Western region. Much of this is attributed to the increased interest in mining. According to the census of 1901, the foreign-born were distributed as follows: British Islands, 290,016; British possessions, 15,837; foreign countries, 278,804 (United States, 127,891); not given, 14,589. In the eastern provinces large numbers have crossed the international boundary into the States—

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particularly into the New England States. There is a decided tendency on the part of many Canadians to pass back and forth across the boundary according to seasonal changes in the labor market. The population of Canada includes a large variety of race elements, and the process of amalgamation has been much less active than in the United States. The great expanse of area and the sparseness of the inhabitants admits of isolation, and is largely responsible for the lack of amalgamation. The French, who were the first settlers, located principally along the Saint Lawrence, in what is now the Province of Quebec, and their descendants still constitute a large majority of the inhabitants of that province. In the determination of the policy of the British Government formerly, and of the Dominion today, the presence of this French element has been and is a main consideration. The French language is still commonly spoken, and is even permitted and often heard in the Dominion Parliament. The French were the hunters and trappers of the early days, and in this capacity scattered throughout the vast domain, mingling freely and amalgamating with the Indians, which accounts for the population of half-breeds so largely represented in Manitoba and the Northwest Territories. The French Canadians are well represented also in the recent Western colonization. In the other Eastern provinces people of British descent are in the great majority—the Scotch in Nova Scotia and the English in the other three. The Irish are well represented in the larger cities. The eastern townships of Quebec were settled by loyalists from the revolted American colonies, who emigrated there during or following the time of the American Revolution. Ontario received a large contingent of the New England opponents to the War of 1812.

In 1900 the Indians in Canada were estimated at 99,000, as follows: British Columbia, 24,523; Manitoba and the Northwest Territory within treaty limits, 24,468; Ontario, 20,703; Northwest Territories outside of treaty limits, 14,566; Quebec, 10,785; Nova Scotia, 2018; New Brunswick, 1639; Prince Edward Island, 308. The number seems to be decreasing, but, owing to the uncertain accuracy of the early enumerations, it is impossible to ascertain the amount of the decrease. The care of the Indians is in the hands of the Indian Department of the Dominion Government, which has a superintendent of Indian affairs in each province. Reservations are provided for the different tribes, but the Indians are not necessarily confined to them. Special provisions, such as annuities and financial assistance, are provided for the Treaty Indians. Others, however, such as those of British Columbia, successfully support themselves. Acts passed by the chiefs and councilors for the regulation of local affairs may be enforced if approved by the Government. Rights of franchise and full citizenship are given the tribes as they become sufficiently advanced in civilization. Much progress is being made in this direction, especially by the tribes of British Columbia, yet hunting and fishing remain their chief occupations, though they work in many sawmills, fisheries, etc. Intertribal conflicts are of rare occurrence, nor has their relation with the General Government been characterized by so great a degree of friction as has prevailed in the United States.

Religion.—There is no State Church, but to the Roman Catholic Church in Quebec are guaranteed the privileges enjoyed previous to British possession. This Church was the first and for a long time practically the only Church in the Canadian territory, and still includes the great mass of the population of Quebec, and over two-fifths of the total church membership of the Dominion. The Catholics are of least relative importance in Ontario and Manitoba. The Methodists, Presbyterians, and Anglicans rank next in order of importance. While all these are well distributed throughout the various provinces except Quebec, the Methodists are far in the lead in Ontario, but are exceeded by the Presbyterians in some of the other provinces, particularly Nova Scotia. Neither of the two latter denominations is divided into numerous factions, as in the United States. Of other denominations, the Baptists and the Lutherans are the strongest. The leading sects have each one or more divinity schools. The following table gives the membership of the leading denominations:

DENOMINATIONS	1891	1901
Anglicans	646,000	680,300
Baptists	257,400	292,400
Baptists (Freewill)	45,100	24,200
Congregationalists	28,100	28,200
Lutheran	63,900	92,300
Methodists	847,700	916,800
Presbyterians	755,300	842,300
Roman Catholics	1,992,000	2,228,900

Cities.—The per cent. of urban population is low. Winnipeg, Vancouver, and Sydney had the highest rate of increase during the last decade. The following gives the population of the principal cities, as returned by the census of 1901: Montreal, 266,000; Toronto, 207,000; Quebec, 68,000; Ottawa, 59,000; Hamilton, 52,000; Winnipeg, 42,000; Halifax, 40,000; Saint John, 40,000; London, 38,000; Vancouver, 26,000.

EDUCATION. There is no centralized system of education for the whole Dominion, each province being left to control its own educational matters. For a fuller statement, therefore, the reader is referred to the articles on the different provinces. In all provinces the schools are free, and in most provinces attendance is compulsory. Local trustees are elected to look after the separate schools, but a careful supervision is exercised by the provincial superintendent and his council. Especially noteworthy is the thorough and comprehensive school system of Ontario. In provinces where Catholics have a strong representation (Quebec, Ontario, and Manitoba), the denominational problem has been the most important one that has confronted the educational system, and in the case of Manitoba it has been of a rather grievous nature. In Quebec there is a complete cleavage between the two sects, extending even to the council of public instruction, which is divided into Catholic and Protestant committees, the former committee being composed of Roman Catholic bishops. In Ontario the educational council is not divided, but either sect, under certain conditions, can establish separate schools. In Manitoba there are no separate schools, but religious instruction may be given to those pupils whose parents may demand it. The expense of the schools is met

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by Government grants and local taxation, the latter covering more than two-thirds of the expenditure for all the provinces, but differing greatly from province to province. There are a large number of universities and classical colleges, including Dalhousie, Nova Scotia (founded 1820); Montreal (1821); New Brunswick, Fredericton (1828); University of Toronto, Ontario (1828); Queen's College, Kingston, Ont. (1841); Laval University, Quebec (1852); University of Manitoba (1877); and the Royal Military College, Kingston, Ont. (1874). The principal scientific societies are the Royal Society of Canada; Natural History Society of Montreal; Canadian Institute, Toronto; Nova Scotia Institute; Natural History Institute, New Brunswick; Scientific and Historical Society, Winnipeg; and Society of Natural History, Victoria, with a fine local museum.

HISTORY. It is probable that Bjarni Herjulfson (q.v.), a Norseman, sighted the coast of Canada, opposite Greenland, in 986, and that Leif Ericson sailed along a considerable part of the eastern coast in 1000. John Cabot (q.v.) in 1497 reached the shores of the New World in the neighborhood of the Gulf of Saint Lawrence. It is upon this voyage that England subsequently based her claim, in part, to the whole of North America. For the most part, however, the territory included within the present Dominion, excluding the former Northwest Territories and the Hudson Bay country, was explored and first settled by the French. Basque and Breton fishermen began to visit the cod-banks of Newfoundland as early as 1504; Denis of Honfleur and Aubert of Dieppe explored the Gulf of Saint Lawrence in 1506 and 1508, respectively; the Baron de Léry made an unsuccessful attempt to settle Sable Island in 1518; and in 1524 Verazzano, under the direction of Francis I., sailed along the coast of North America from the thirty-fourth to the fiftieth parallel of north latitude. In 1534 Jacques Cartier (q.v.) entered the Saint Lawrence and at Gaspé took formal possession of the country in the name of the King of France; and on a second voyage, in 1535-36, he ascended the river as far as Hochelaga (Montreal), wintered at Stadaconé (Quebec), and, while passing up the stream, entered the present harbor of Sainte-Genevieve, and gave it the name Saint Lawrence, which was afterwards extended to the gulf and the river. Jean François de la Roque, Sieur de Roberval (q.v.), with the assistance of Cartier, made an abortive attempt to establish a colony at Cape Rouge in 1541-43. The Marquis de la Roche received a commission from the King as lieutenant-general of Canada, and in 1598 having bargained to colonize New France, established a short-lived settlement on Sable Island; and in the following year Pontgravé and Chauvin established an equally short-lived settlement at the mouth of the Saguenay. In 1603 Champlain made the first of his voyages to Canada, and his name is inseparably connected with the history of New France from that date until the time of his death, in 1635. (See CHAMPLAIN, SAMUEL DE.) In 1604 he assisted Pierre du Guast, Sieur de Monts, in bringing out a colony which first settled on Dochet Island, in the Saint Croix, and in the following year was moved to the site of the present Annapolis in Acadia or Nova Scotia (q.v.). This colony, however, was broken up temporarily by the English under Samuel Argall, in 1613, and the first permanent settlement in Canada was made at Quebec in 1608 by Champlain, who within the next few years discovered lakes Champlain (1609), Huron (1615), and Erie (1615), established a temporary settlement at Montreal (1611), and by taking part with the Hurons and Algonquins, the original inhabitants of Canada, against the Five Nations, in 1609 and 1615, committed France to a policy which was to be of the greatest significance in the history of New France, arousing, as it did, the enmity of the powerful Iroquois, who united first with the Dutch and then with the English, and frequently thwarted the French in their schemes of expansion and conquest. In addition to making numerous inroads upon the settlements of the French themselves, they in time virtually annihilated the Hurons, who had allied themselves to France. "They ruined," says Parkman, "the trade which was the life-blood of New France; they stopped the current of her arteries and made all her early years a misery and a terror." The French governors repeatedly attempted to overcome the Confederacy, and at times seemed on the point of meeting with success; but in spite of severe reverses and of the occasional destruction of their towns, the Iroquois continued to stand as a barrier to French encroachments and as a protection to the English colonists, though, largely as a result of the vigorous policy of Frontenac (q.v.), the ablest of the French governors after Champlain, their aggressions and inroads virtually ceased in the beginning of the Eighteenth Century. In 1625 several Jesuits arrived at Quebec, and for almost half a century thereafter the order had a preponderating influence over secular as well as religious affairs, insomuch that during the early period of its history New France was in many respects essentially a mission. The affairs of the colony having been grossly mismanaged in the first two decades, Richelieu, in 1627, organized the Company of New France, better known as the 'Company of the Hundred Associates'—a corporation which, under the quasi-supervision of the Crown, virtually ruled the whole of New France until 1663, besides exercising a monopoly over the immensely valuable fur trade. In 1642 Montreal was permanently founded by a company of religious enthusiasts headed by the Sieur de Maisonneuve, and in 1659 Laval (q.v.), the titular bishop, by papal appointment, of Petræa in Arabia, was placed at the head of the Catholic Church in New France, in which capacity he had a powerful influence for many years over civil as well as ecclesiastical affairs.

In 1663 Louis XIV. dissolved the Company of New France and placed Canada under the direct control of the Crown, though for ten years thereafter (1664-74) a new corporation, the 'Company of the West,' exercised a virtual monopoly over the trade of the colony. Under the royal Government, which lasted until 1760, the affairs of New France were administered by a Governor, an Intendant, and a Superior Council, all appointed by the Crown, the Governor being empowered to command the troops, conduct negotiations with foreign colonies and Indian tribes, and supervise all matters of administrative routine; the Intendant to preside at the Council, exercise independent legislative

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and judicial power, and supervise the expenditure of all public moneys, besides acting virtually as a spy on the Governor; and the Supreme Council, composed of the Governor, the Intendant, the Bishop, and five, later seven, and still later thirteen, councilors, to issue decrees for the government of the colony in civil and fiscal affairs, and to sit in judgment on various civil and criminal causes. The distinctive features of the government of Canada throughout the French régime were absolutism and paternalism, the individual settler being robbed of all initiative and forced to look for everything to the general Government, which habitually intervened in the most trivial affairs of every-day life. During the period of royal control, the celebrated feudal system of Canada, first established by Richelieu, and based, with important modifications, upon the system which had obtained in ancient France, took definite form. Large grants, called *seignories*, were made to men of rank or prominence, known as *seigneurs*, who held, in many cases directly from the Crown, by the 'tenure of faith and homage,' and who, in turn, made smaller grants to the *habitants* or *censitaires*, whose tenure rested upon their payment of annual rentals in money or produce, and in some cases upon their rendering to their over-lords certain feudal services, such, for instance, as the *corvée*. The settlements, called *côtes*, were almost uniformly made along streams, the houses being built in long lines, instead of being arranged around a common centre, as was the case in many of the New England villages—each *habitant* receiving a narrow strip of land, fronting on a river or creek and extending for a considerable distance to the rear. The system was not interfered with at the time of the English conquest in 1760, and survived in Lower Canada (Quebec) until 1854, when it was finally abolished.

With the English Colonists to the south the inhabitants of New France came into conflict during the last part of the Seventeenth Century. Such events as the destruction of the French settlement at Port Royal by Argall in 1613, or the capture and occupation of Quebec by David Kirke in 1629-32 may be regarded as sporadic; but with the outbreak of the first of the so-called French and Indian wars in 1689, the long contest between the French and English for supremacy in North America was initiated. (See KING WILLIAM'S WAR; QUEEN ANNE'S WAR; KING GEORGE'S WAR; FRENCH AND INDIAN WAR.) Of these wars, the first two especially, 1689-97 and 1702-13, may be differentiated from the last as being essentially the fighting out of European quarrels on American soil. On the part of the French, the conflict took the form of sudden raids, with the help of their Indian allies, on the frontier settlements of New York and New England. Though no important victory was gained on either side, the English nevertheless acquired by the Treaty of Utrecht (1713) Acadia, Newfoundland, and the Hudson Bay Territory. Thirty-five years of peace followed, marked by rapid development both among the French and the English. The tide of English colonization, breaking through the passes of the Alleghanies, was checked by the French, who had made themselves masters of the great rivers of the west. The war which broke out in 1754 was essentially American, and though it later merged into the greater struggle of the Seven Years' War, the stake between England and France was the mastery in America. In the French and Indian War, Canada experienced both the advantages and disadvantages of the absolute system of government under which it lived. Against the armies of Great Britain, weakened by incapacity on the part of their commanders and constant friction between British officers and the Colonials, it presented a force of trained fighters, under officers, for the most part, acquainted with the nature of the country, and acting all under the direction of one supreme will. This would account for the ill success of the English during the first part of the war. When it came, however, to a test of endurance between the combatants, Canada, with its sparse population of fur traders and forest rangers, could never hope to hold out against the English Colonists, if, as was the fact, it was forced to depend for help on distant France, with the British holding the mastery of the seas. The capture of Quebec by Wolfe in September, 1759, practically ended the war. By the Treaty of Paris (q.v.) in 1763, Canada, together with all the territory between the Alleghanies and the Mississippi River, claimed by France, was ceded to Great Britain.

Canada was under a military government from 1760 to 1764, and under a sort of provisional government, organized in pursuance of a proclamation by George III., from 1764 to 1774, when the British Parliament passed an important measure known as 'The Quebec Act' (q.v.), which extended the province to the Ohio and Mississippi rivers, provided that Roman Catholics should not be interfered with in their religion, intrusted the administration of affairs to a Governor and a Legislative Council appointed by the Crown, and formally recognized the old civil laws and civil institutions of French Canada, though the English criminal laws were to be in force throughout the province. During the American Revolution, the Continental Congress attempted to secure the active alliance of Canada, and to that end sent a commission, made up of Franklin, Chase, Charles Carroll, and John Carroll, to Quebec; but the province remained loyal throughout, and at the close of the war its population was augmented by the immigration from the United States of between 30,000 and 40,000 Loyalists, whose advent, says the Canadian historian Bourinot, "was the saving of British interests in the great region which England still happily retained in North America." It was these immigrants who founded New Brunswick and Upper Canada (Ontario), and their descendants have continued to the present day to constitute perhaps the most important and influential element in the population of Canada.

By the treaty of 1783, the area of Canada, as established by the Quebec Act, was reduced by the formal relinquishment to the United States of the territory now constituting the States of Wisconsin, Michigan, Ohio, Indiana, and Illinois, and in 1791 the province was divided by the so-called 'Constitutional Act' into two sections, 'Upper Canada' and 'Lower Canada,' the former of which, then having a population of about 20,000, was inhabited almost entirely by men of English descent, and the latter, then having a population of about 125,000, largely by men of French descent. Each sec-

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tion was to have a Legislative Council, to be appointed by the King, for life; an assembly, to be chosen by a popular vote; and a Governor and Executive Council, to be appointed by the King; while French institutions were for the most part to obtain in the one and English institutions in the other. The so-called 'Maritime Provinces'—New Brunswick, Nova Scotia, Cape Breton, and Prince Edward Island—were placed under administrations very similar to that of Upper Canada. In Lower Canada a party of discontent almost immediately arose, and until the reorganization of the Government, in 1841, there was almost continual friction between the Popular Assembly on the one side, representing the French element, and the Governor and Legislative Council on the other, representing almost exclusively the English element. In spite of the unifying influence of the War of 1812 with the United States (see UNITED STATES, *History*), in which men of all races throughout Canada participated, this racial antagonism became more and more accentuated, until, in 1837, a certain element of the French population, under the leadership of Louis J. Papineau (q.v.), angered by the intervention of the British Government, rose in revolt against the British authority, but were quickly suppressed.

Meanwhile in Upper Canada much discontent was caused by the political dominance of a small class, descended from the Loyalists, and united, it was charged, under an alleged 'family compact' for the purpose of monopolizing the public offices. The popular dissatisfaction with the prevailing state of affairs was greatly increased by religious antagonisms and by the exposure, through the agency of one Robert Gourlay, of apparent frauds in the disposition of public lands. In 1837, also, the more radical of the reformers, doubtless encouraged by the outbreak in Lower Canada, organized a 'rebellion,' under the leadership of William L. Mackenzie (q.v.), but were defeated and driven out of the province before the close of the following year. Meanwhile Lord Durham had been sent out from England as Governor-General and high commissioner "for the determining of certain important questions depending in the provinces of Upper and Lower Canada, respecting the form and future government of the said provinces," and, largely as a result of the famous report made by him in 1839, the two provinces were reunited, in 1841, by an act of Parliament, which provided for a Governor, to be appointed by the Crown, a Legislative Council, also to be appointed (for life) by the Crown; a Legislative Assembly, to which Upper and Lower Canada were to send an equal number of representatives, to be elected by popular vote; and an Executive Council, or Cabinet, to be chosen by the Governor from the Legislative Council and the Legislative Assembly. The Maritime Provinces, meanwhile, retained their separate governments.

After the union of Upper and Lower Canada, the advantages of a federal union of all the provinces became more and more apparent, especially since, by reason of the plan of equal representation, and the unequal growth of the two united provinces, a reorganization of some kind was rendered imperative. In 1864 a convention of delegates representing the various provinces was held at Quebec for the purpose of considering the advisability of union, and under the leadership of Sir John Macdonald (q.v.) formally adopted a set of resolutions, which served as the basis for the Act of Union passed by the British Parliament in February, 1867. Under this act, the provisions of which are given in another part of this article, Upper and Lower Canada, Nova Scotia, and New Brunswick were formally united as the Dominion of Canada, which subsequently—in 1871 and 1873, respectively—received the accession of British Columbia and Prince Edward Island. Newfoundland, however, refused to enter the union, and still continues to hold herself aloof. The vast territory which since 1670 had been under the control of the Hudson Bay Company, was acquired by the Dominion in 1869—an event which provoked an uprising, along the Red River, of the half-breeds under Louis Riel (q.v.), and in 1870 this territory was subdivided into Manitoba, which was immediately admitted into the Dominion on equal terms with the other provinces, and the Northwest Territories, out of which districts were subsequently created as follows: Keewatin, in 1876; and Assiniboia, Saskatchewan, Alberta, and Athabasca, in 1882. The principal events since the creation of the federation in 1867, in addition to those already mentioned, have been the raids of the Fenians in 1870-71, who had also made a desultory attack in 1866 (see FENIANS); the adoption of a high customs tariff in 1876; a second outbreak of the half-breeds and Indians under Riel in 1885; the completion of the Canadian Pacific Railroad in the same year; and the agitation in Newfoundland (1887-91) over encroachments by French fishermen.

The boundary line between Canada and the United States, which was determined with considerable vagueness by the treaty of 1783, has formed the subject of much controversy between the United States and Great Britain, and was not finally settled for the northeast until 1842, and for the northwest until 1846. The question of the right of the Americans to fish in Canadian waters has also been the subject of considerable controversy between the two governments (see FISHERIES), as has also the right of the Canadians to participate in the seal fisheries in Bering Sea (see BERING SEA CONTROVERSY). From 1854 to 1866 there was a reciprocity treaty with regard to trade and commerce between Canada and the United States, and since its repeal frequent attempts without avail have been made by the Canadian Government to secure its renewal.

BIBLIOGRAPHY. For a bibliography of works on Canadian history, consult: Faribault, *Catalogue d'ouvrages sur l'histoire de l'Amérique et en particulier sur celle du Canada* (Quebec, 1837); Gagnon, *Essai de bibliographie canadienne* (Quebec, 1895); Wrong, *Review of Historical Publications Relating to Canada* (Toronto, 1897—); and Larned (ed.), *The Literature of American History* (Boston, 1902). For the French régime, consult: Charlevoix, *Histoire et description générale de la Nouvelle France* (3 vols., Paris, 1744; English translation, 6 vols., New York, 1866-72); Thwaites (ed.), *Jesuit Relations and Allied Documents* (73 vols., Cleveland, 1896-1901); Faillon, *Histoire de la colonie française en Canada* (3 vols., Montreal,

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1865-66); Miles, *History of Canada Under the French Régime* (Montreal, 1881); Winsor, *Cartier to Frontenac* (Boston, 1894); and especially Parkman's works, *The Pioneers of France in the New World* (*Boston*, 1865); *The Jesuits in North America* (Boston, 1867); *La Salle and the Discovery of the Great West* (Boston, 1869); *The Old Régime in Canada* (Boston, 1874); *Frontenac and New France Under Louis XIV.* (Boston, 1877); *A Half Century of Conflict* (Boston, 1892); and *Montcalm and Wolfe* (Boston, 1884). For the period since 1760, consult: Bourinot, *Canada Under British Rule* (Cambridge, 1901); Pope, *Memoirs of John Alexander Macdonald* (2 vols., London, 1894); Lindsey, *Life and Times of William Lyon Mackenzie* (Toronto, 1862); Bibaud, *Histoire du Canada sous la domination anglaise* (3 vols., Montreal, 1837-78); Christie, *History of the Late Province of Lower Canada* (6 vols., Quebec, 1848-55); Dent, *Story of the Upper Canadian Rebellion* (2 vols., Toronto, 1885), and *The Last Forty Years: Canada Since the Union of 1841* (2 vols., Toronto, 1881); Durham, *Report on the Affairs of British North America* (London, 1838; republished, London, 1901); and Read, *The Canadian Rebellion of 1837* (Toronto, 1896). The best comprehensive histories are Kingsford, *History of Canada* (10 vols., Toronto, 1887-98); Garneau, *Histoire du Ca* (4 vols., Quebec, 1845-52; English translat 2 vols., Montreal, 1860); Ferland, *Cours d' toire du Canada* (2 vols., Quebec, 1861-67); Bryce, *Short History of the Canadian Pe* (London, 1887); Macoun, *Manitoba and Great Northwest* (Guelph, 1882); Ingers "The Climate of the Canadian West," in *Canadian Record of Science* (Montreal, 188 Greswell, *Geography of the Dominion of C ada* (London, 1891); Dawson, "North Am ica," Vol. I., in *Stanford's Compendium of Ge raphy and Travel* (London, 1897); Parkin. *Great Dominion* (London, 1895); *British Amer* Vol. III. of the British Empire Series (Lond 1900); Lucas, *A Historical Geography of British Colonies*, Vol. V. (Oxford, 1901); *Dominion of Canada*, prepared by the British sociation for the Advancement of Science (L don, 1897); *Annual Reports of the Geologic and Natural History Survey of Canada* (Otta 1872, et seq.); Willmott, *Mineral Wealth of C ada* (London, 1898); Joncas, *Fisheries of Cana* (London, 1885); Dilke, *Problems of Greater Br ain* (London, 1890); Adam, *The Canadian Nor west: Its History and Its Troubles* (Toron 1885); Dawson, *Fifty Years' Work in Cana* (London, 1901); Masson, *Les bourgeois de compagnie du Nord-Ouest* (Quebec, 1889); Mi *New Lands* (Philadelphia, 1900).

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